ADDITIONAL

Service Manual

PIONEER

ORDER NO.
CRT1041

TROUBLESHOOTING GUIDE

COMPONENT CAR STEREO EQUALIZER DECK

KPX-999 ES
KPX-777 EW, ES

- These materials contain diagnostic procedures for efficient troubleshooting of the KPX-999 and KPX-777. Please use them together with the product service manuals.
- The contents of the materials have been organized around the microcomputer.
- Please carry out the diagnostic procedures beginning with "OVERALL TROUBLESHOOTING" on page 3.

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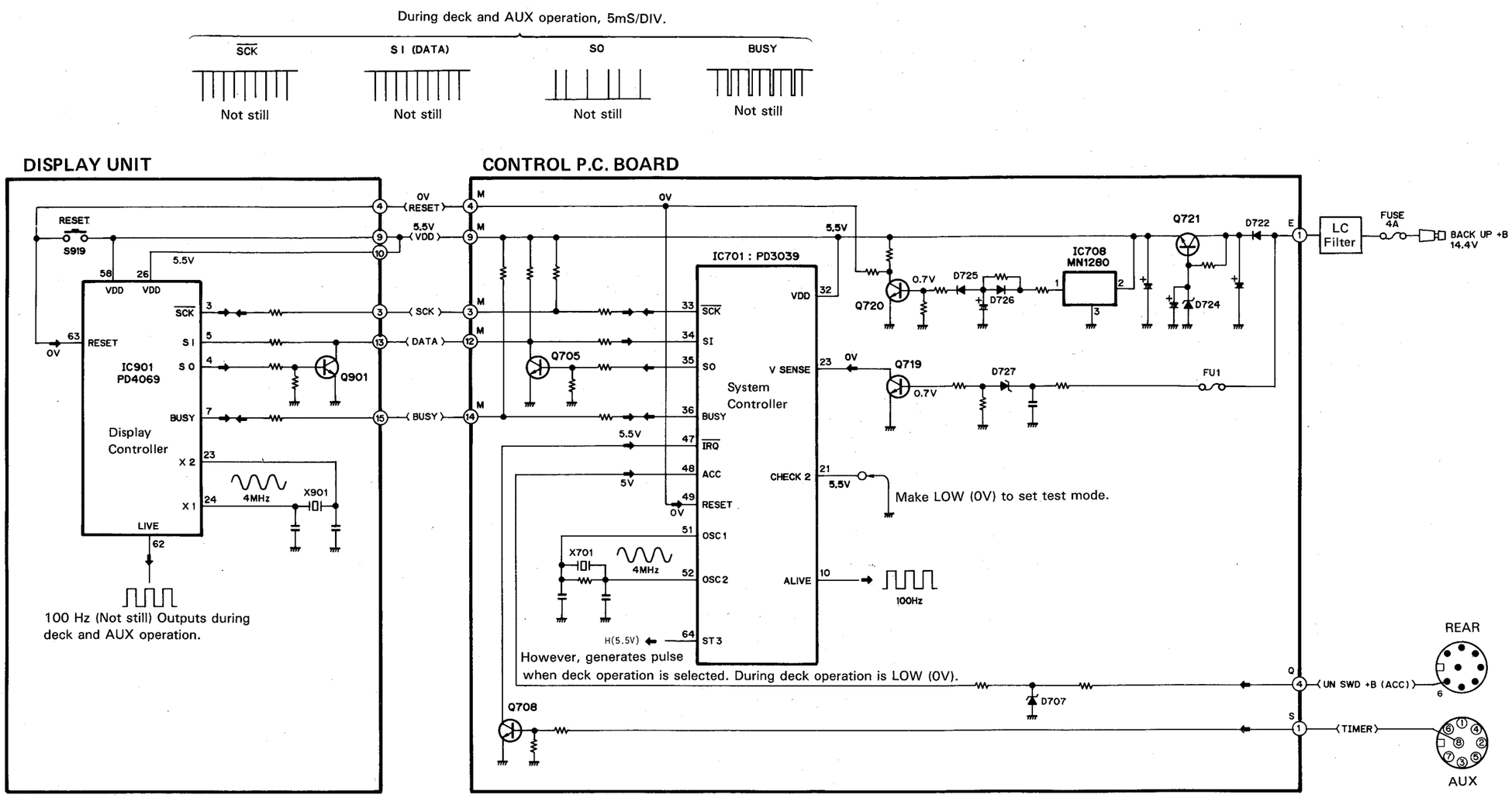


Fig. 1

Troubleshoot "
CANNOT BE SI

BUSY

Not still

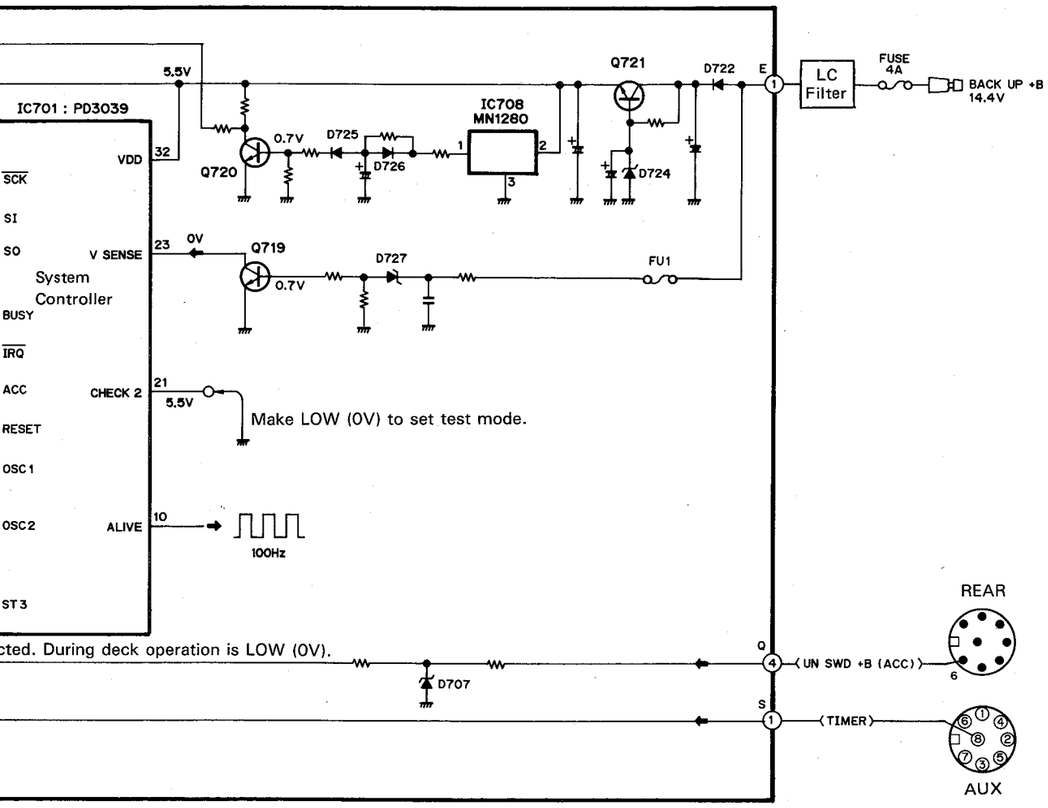
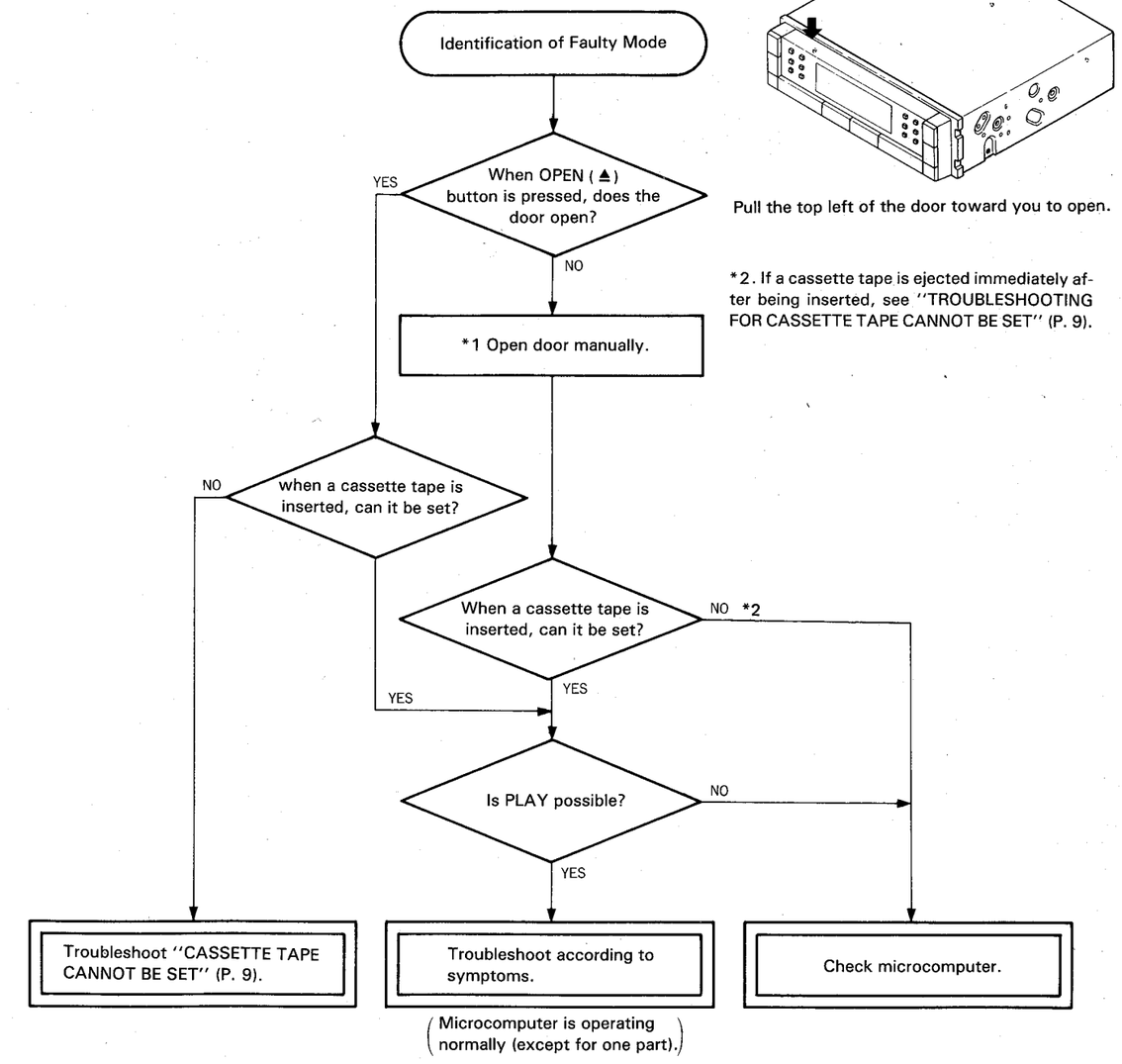
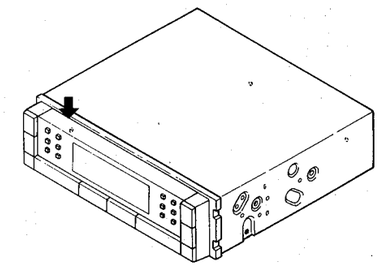


Fig. 1

1. OVERALL TROUBLESHOOTING


Identification of Faulty Mode
When OPEN (▲) button is pressed, does the door open?
YES
NO
*1 Open door manually.
NO
when a cassette tape is inserted, can it be set?
When a cassette tape is inserted, can it be set?
NO *2
YES
YES
Is PLAY possible?
NO
YES
Troubleshoot "CASSETTE TAPE CANNOT BE SET" (P. 9).
Troubleshoot according to symptoms.
Check microcomputer.
(Microcomputer is operating normally (except for one part).)

*1

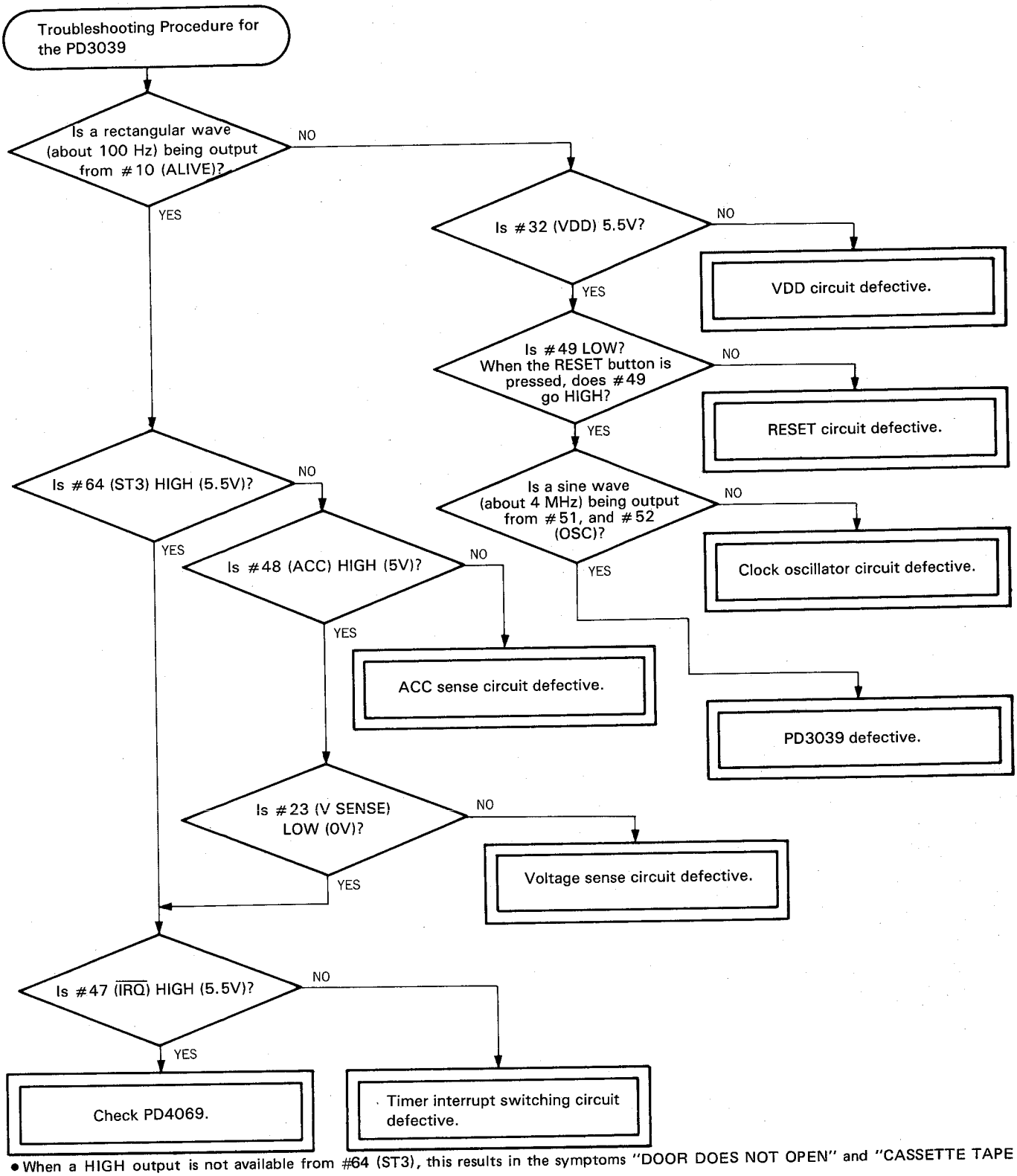


Pull the top left of the door toward you to open.

*2. If a cassette tape is ejected immediately after being inserted, see "TROUBLESHOOTING FOR CASSETTE TAPE CANNOT BE SET" (P. 9).

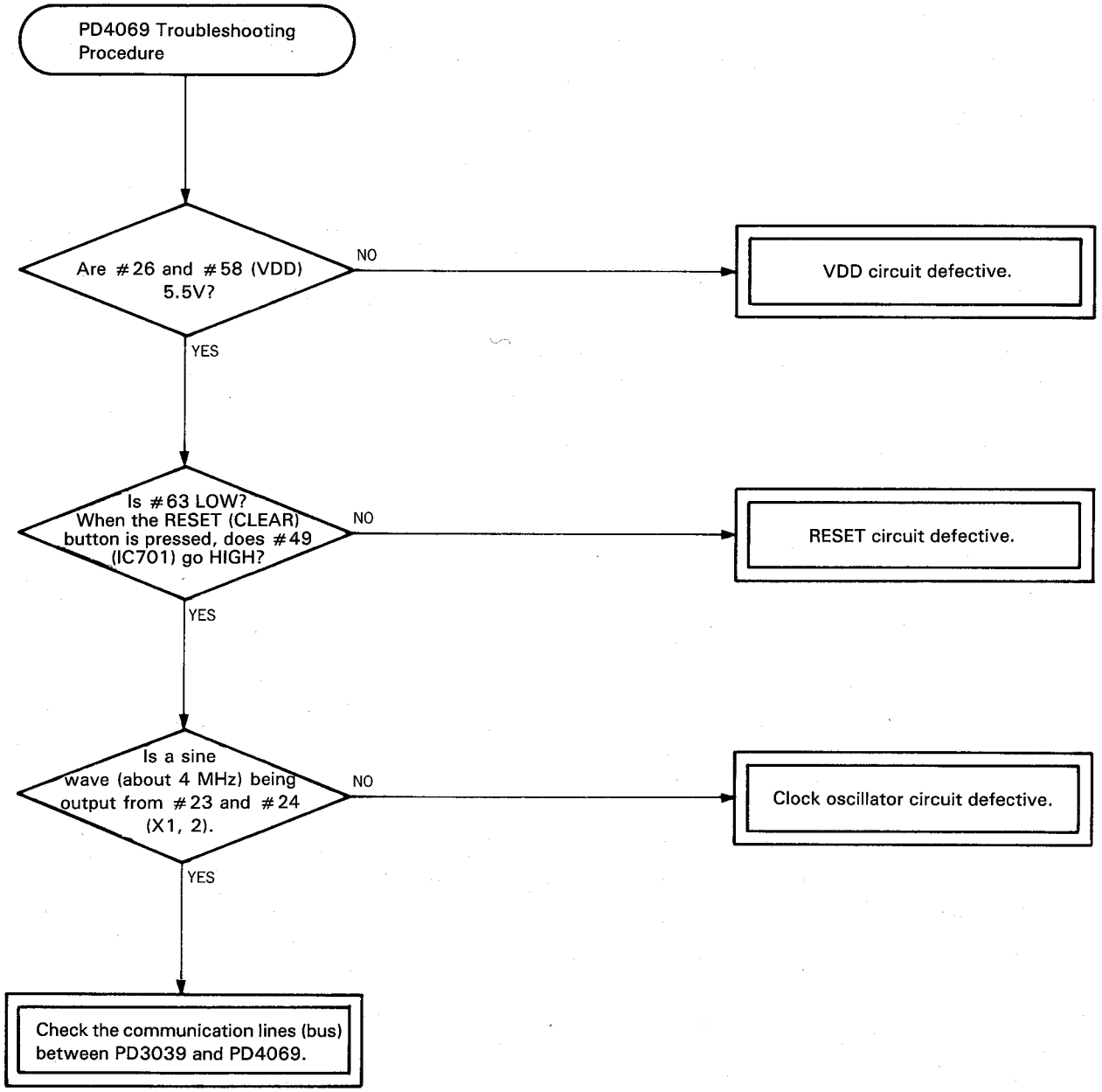
2. TROUBLESHOOTING THE MICROCOMPUTER

2-1 TROUBLESHOOTING PROCEDURE FOR THE PD3039 (FIG. 1)

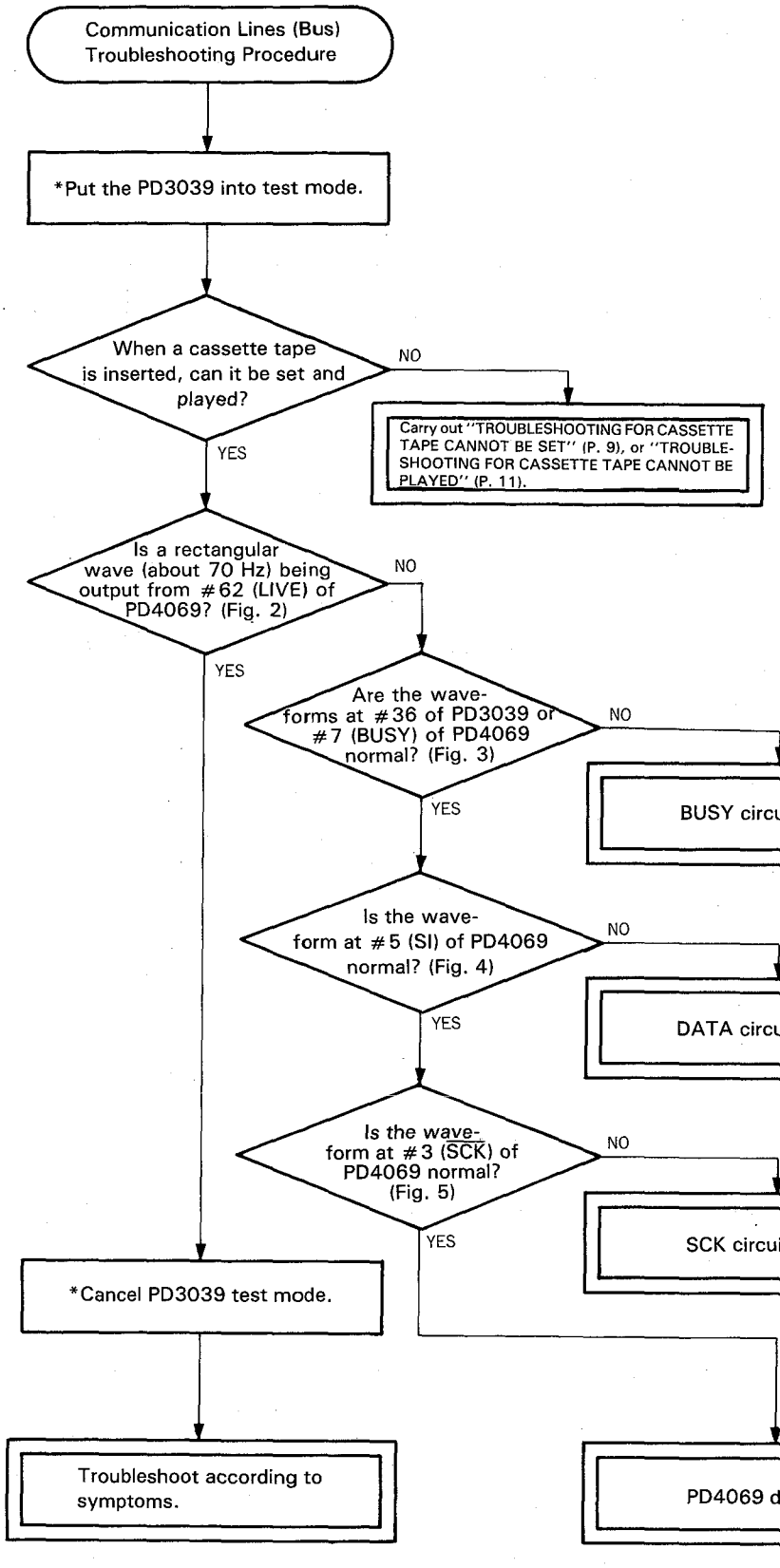


- When a HIGH output is not available from #64 (ST3), this results in the symptoms "DOOR DOES NOT OPEN" and "CASSETTE TAPE CANNOT BE SET".
- When a HIGH input is not supplied to #47 ($\overline{IRQ}$), the cassette tape can be set, but PLAY operation cannot be performed.

2-2 TROUBLESHOOTING PROCEDURE FOR THE PD4069 (FIG. 1)


PD4069 Troubleshooting Procedure
Are #26 and #58 (VDD) 5.5V?
NO
VDD circuit defective.
YES
Is #63 LOW? When the RESET (CLEAR) button is pressed, does #49 (IC701) go HIGH?
NO
RESET circuit defective.
YES
Is a sine wave (about 4 MHz) being output from #23 and #24 (X1, 2).
NO
Clock oscillator circuit defective.
YES
Check the communication lines (bus) between PD3039 and PD4069.

2-3 TROUBLESHOOTING PROCEDURE FOR THE PD3039 & PD4069 COMMUNICATION LINES (BUS) (FIG. 1)


Communication Lines (Bus) Troubleshooting Procedure
*Put the PD3039 into test mode.
When a cassette tape is inserted, can it be set and played?
NO
YES
Carry out "TROUBLESHOOTING FOR CASSETTE TAPE CANNOT BE SET" (P. 9), or "TROUBLESHOOTING FOR CASSETTE TAPE CANNOT BE PLAYED" (P. 11).
Is a rectangular wave (about 70 Hz) being output from #62 (LIVE) of PD4069? (Fig. 2)
NO
YES
Are the waveforms at #36 of PD3039 or #7 (BUSY) of PD4069 normal? (Fig. 3)
NO
YES
BUSY circuit defective.
Is the waveform at #5 (SI) of PD4069 normal? (Fig. 4)
NO
YES
DATA circuit defective.
Is the waveform at #3 (SCK) of PD4069 normal? (Fig. 5)
NO
YES
SCK circuit defective.
*Cancel PD3039 test mode.
Troubleshoot according to symptoms.
PD4069 defective.

*To put the PD3039 into test mode:

(1) Turn OFF the back-up and ACC power supplies.

(2) While keeping #21 of PD3039 connected to ground (LOW), turn ON the back-up and ACC power supplies.

(3) Disconnect #21 of PD3039 from ground.

To cancel the PD3039 test mode:

(1) Turn OFF the back-up and ACC power supplies.

(2) Turn ON the back-up and ACC power supplies.

Putting the PD3039 into test mode, allows it to carry out mechanical cassette operations, independently of the PD4069.

For details, refer to the service manual explanation of communication OFF mode (P. 46 for KPX-999, P. 44 for KPX-777).

Test mode waveforms (5 mS/DIV)

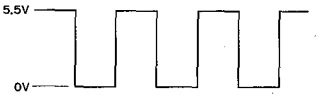


Fig. 2

Fig. 3

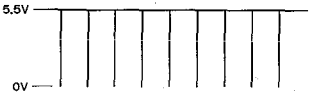


Fig. 4

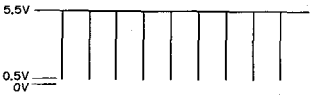
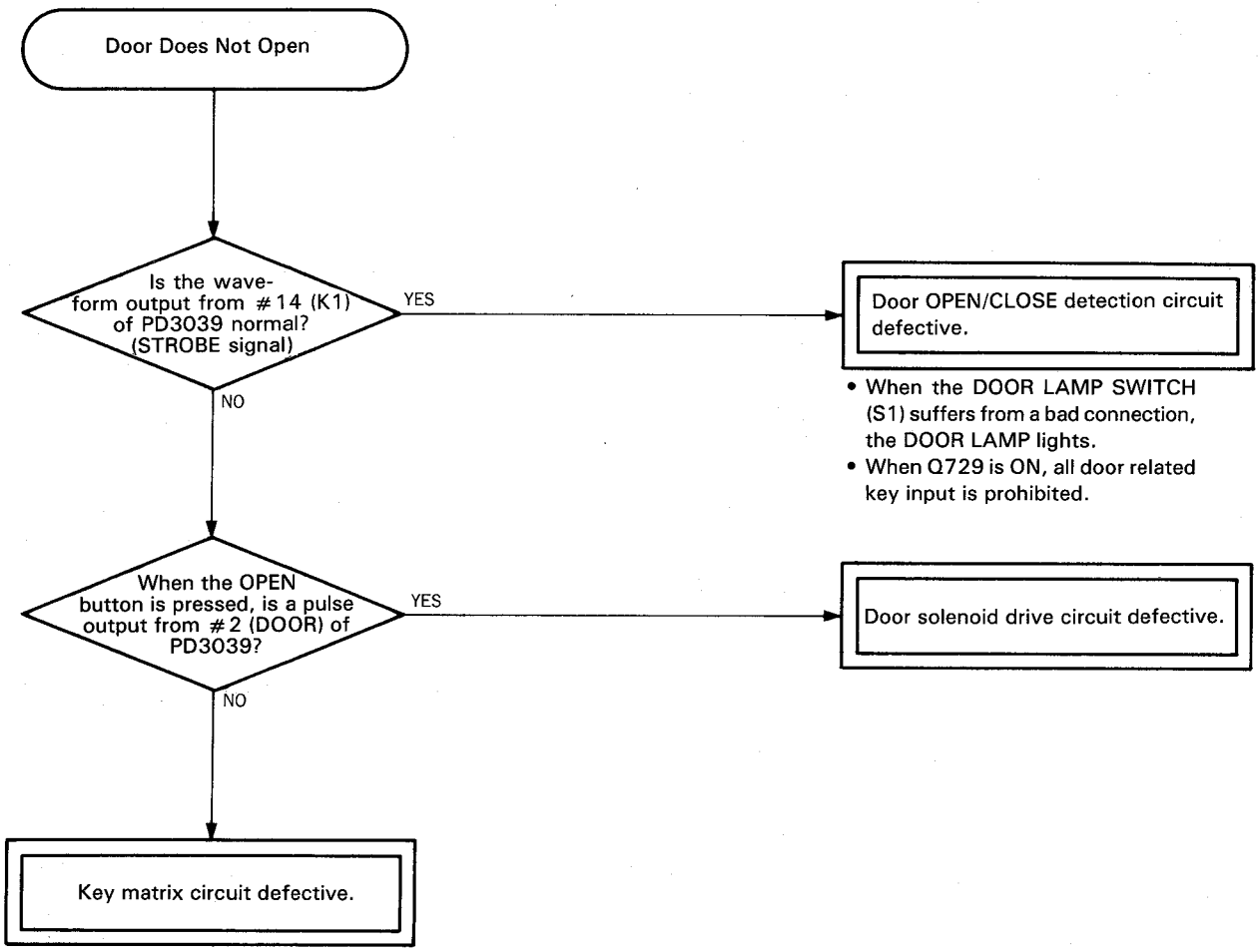


Fig. 5

3. TROUBLESHOOTING FOR DOOR DOES NOT OPEN (Fig. 6)


Door Does Not Open
Is the wave-form output from #14 (K1) of PD3039 normal? (STROBE signal)
YES
NO
Door OPEN/CLOSE detection circuit defective.
• When the DOOR LAMP SWITCH (S1) suffers from a bad connection, the DOOR LAMP lights.
• When Q729 is ON, all door related key input is prohibited.
When the OPEN button is pressed, is a pulse output from #2 (DOOR) of PD3039?
YES
NO
Door solenoid drive circuit defective.
Key matrix circuit defective.

DOOR OPEN DRIVE CIRCUIT

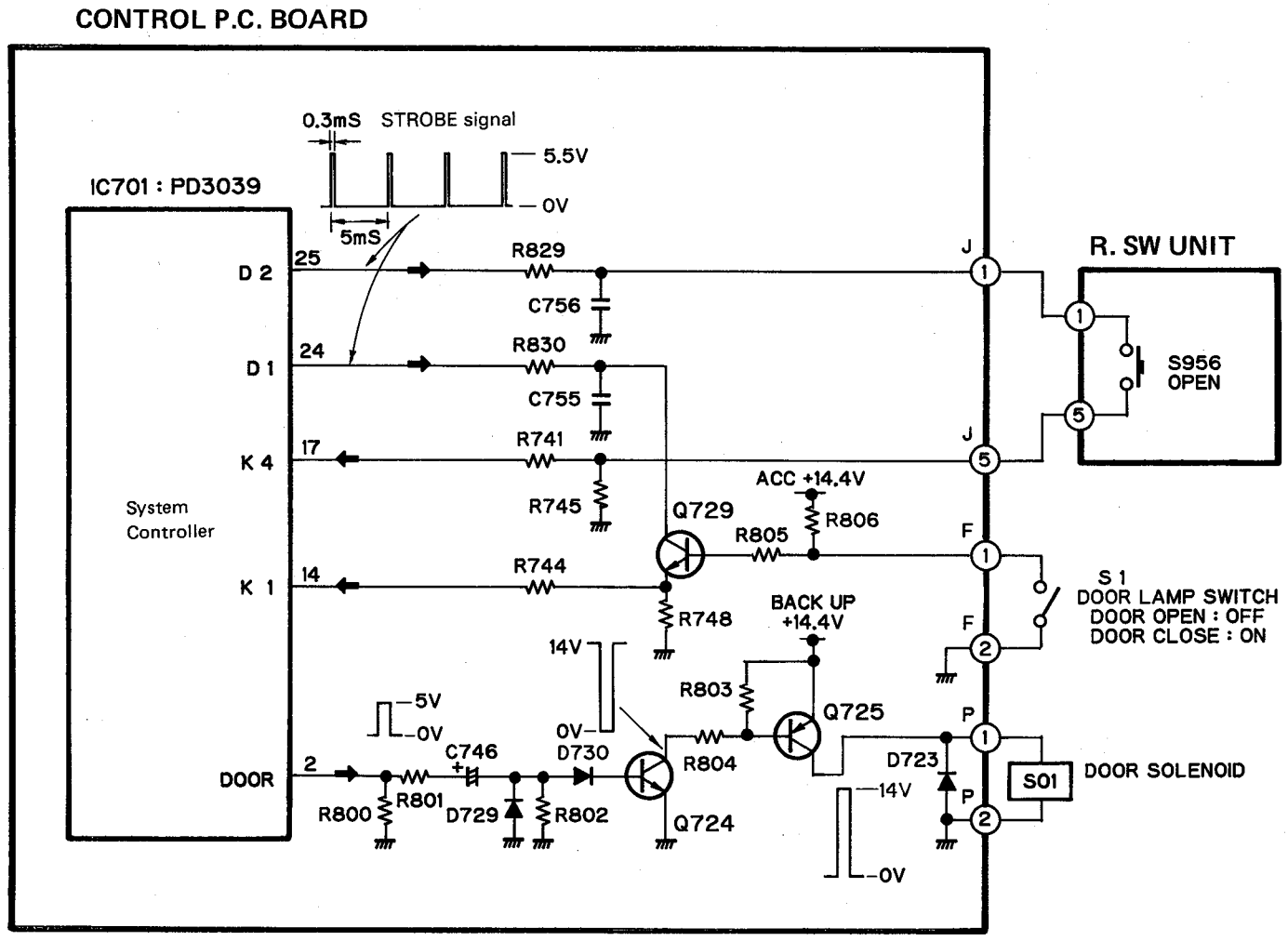
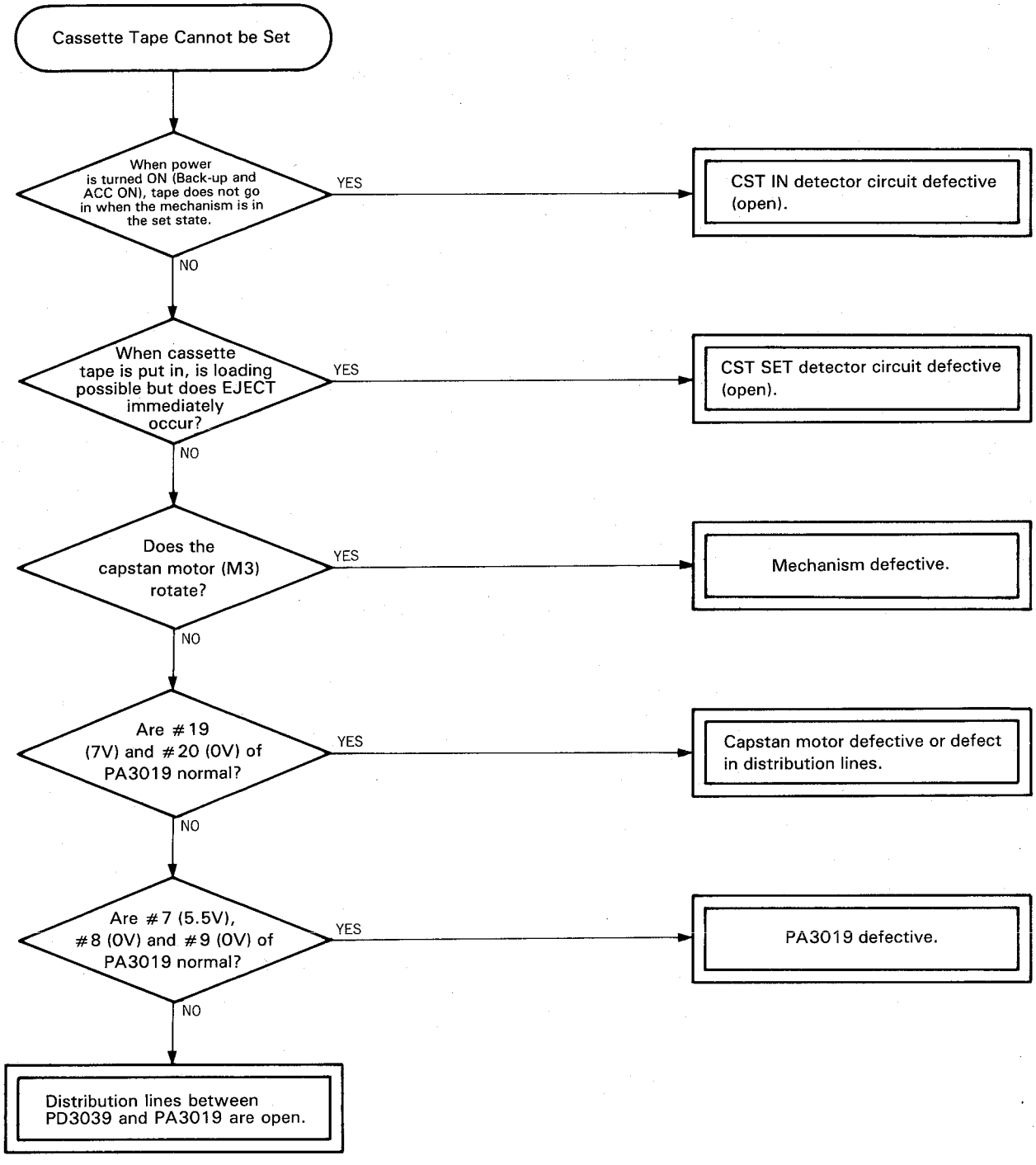


Fig. 6

4. TROUBLESHOOTING FOR CASSETTE TAPE CANNOT BE SET (Fig. 7)


Cassette Tape Cannot be Set
When power is turned ON (Back-up and ACC ON), tape does not go in when the mechanism is in the set state.
YES
CST IN detector circuit defective (open).
NO
When cassette tape is put in, is loading possible but does EJECT immediately occur?
YES
CST SET detector circuit defective (open).
NO
Does the capstan motor (M3) rotate?
YES
Mechanism defective.
NO
Are #19 (7V) and #20 (0V) of PA3019 normal?
YES
Capstan motor defective or defect in distribution lines.
NO
Are #7 (5.5V), #8 (0V) and #9 (0V) of PA3019 normal?
YES
PA3019 defective.
NO
Distribution lines between PD3039 and PA3019 are open.

CASSETTE TAPE LOADING CIRCUIT

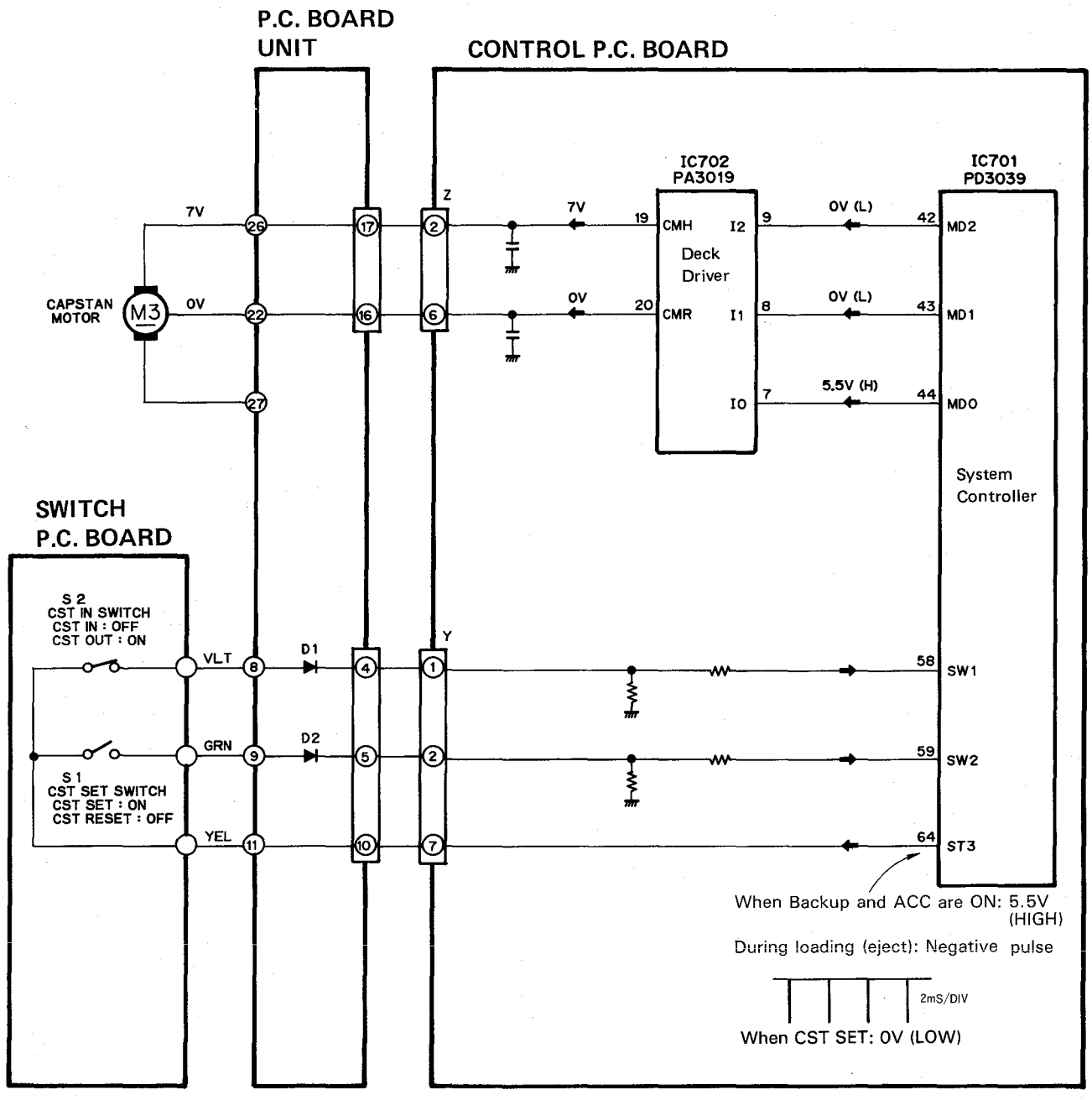
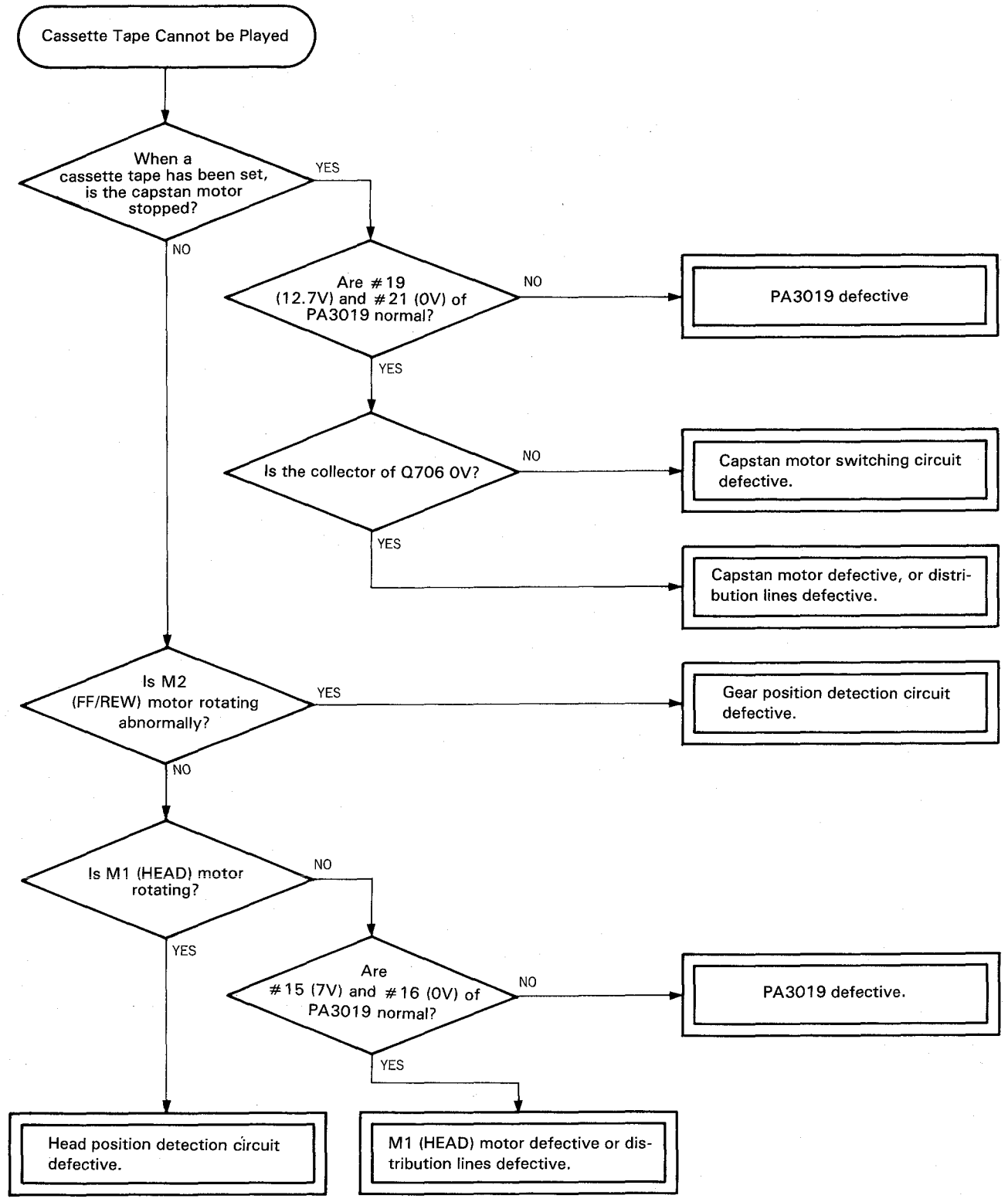


Fig. 7

5. TROUBLESHOOTING FOR CASSETTE TAPE CANNOT BE PLAYED (Fig. 8)

(Cassette tape can be set, but cannot be played.)



MOTOR DRIVE CIRCUIT

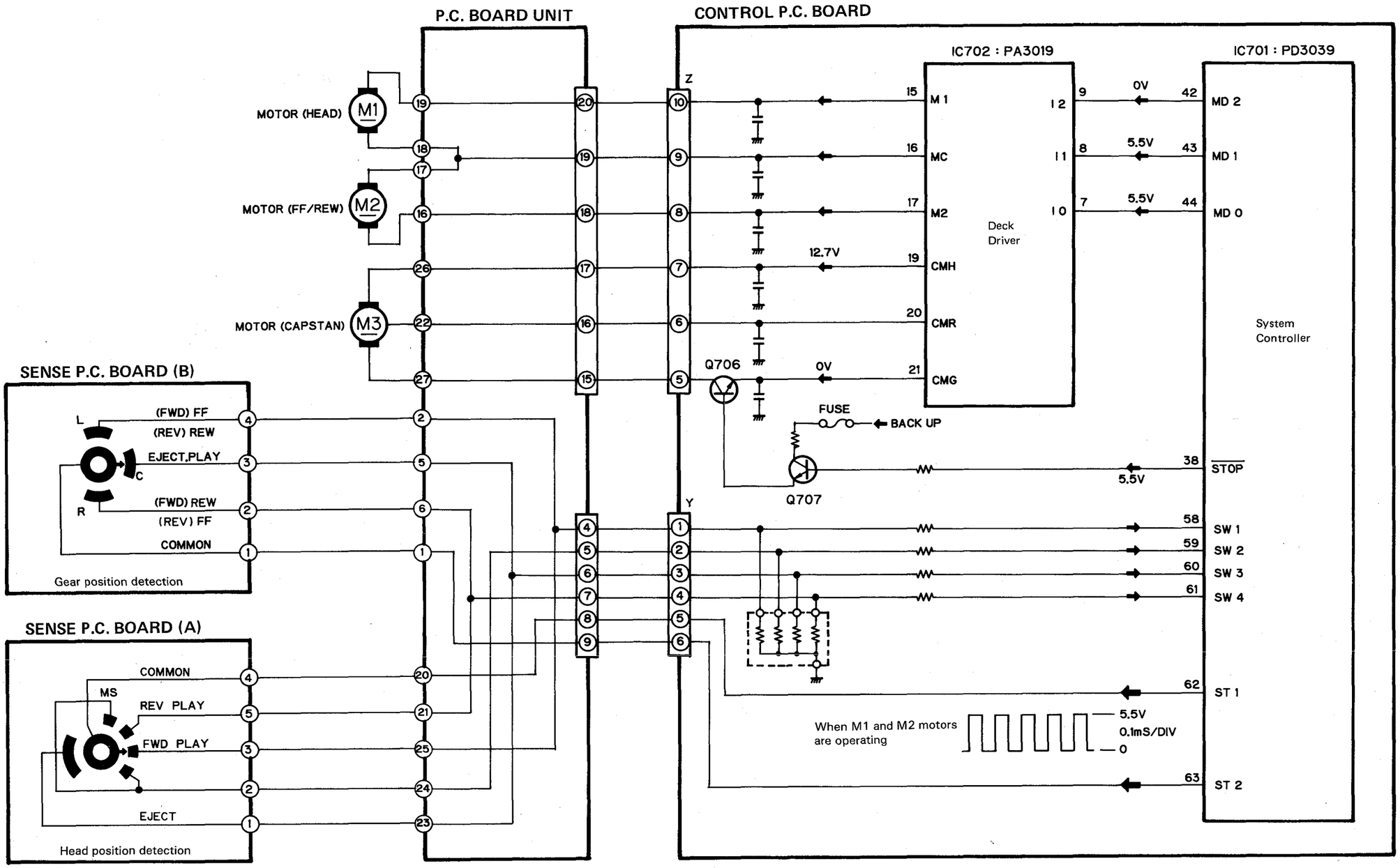


Fig. 8

VOLUME GRAPHIC EQUALIZER CONTROL CIRC

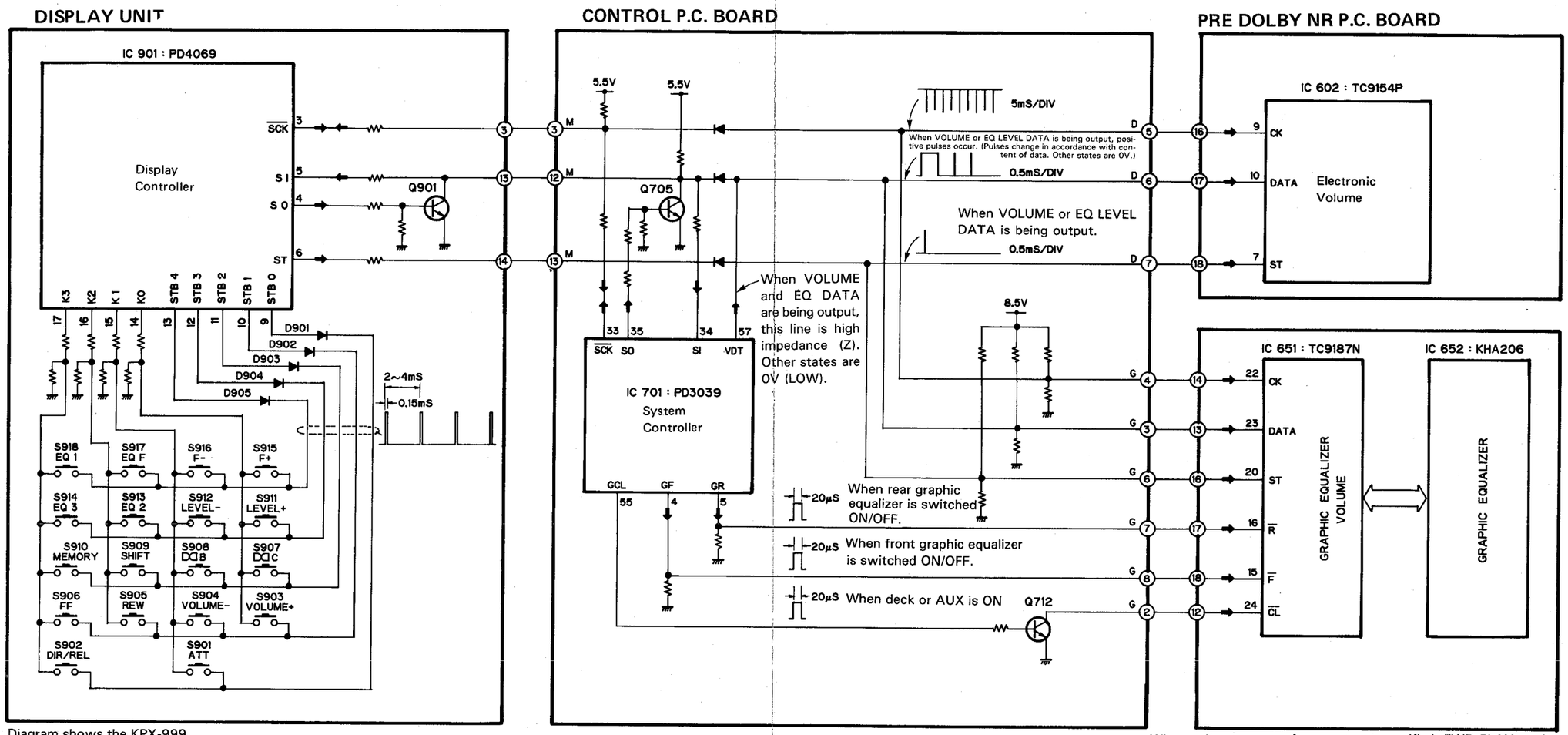


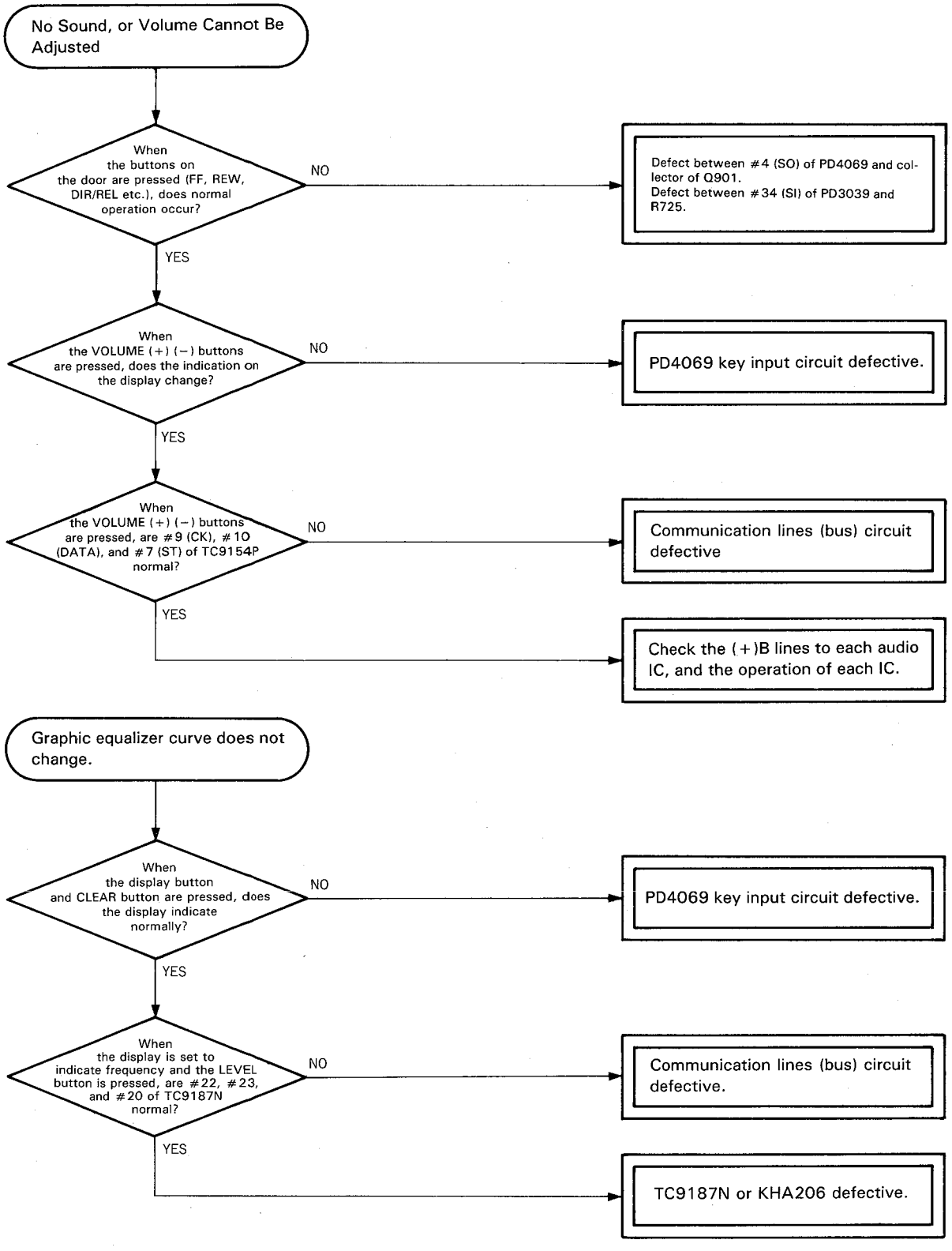
Diagram shows the KPX-999

When voltage or waveforms are not specified, FWD•PLAY mode.

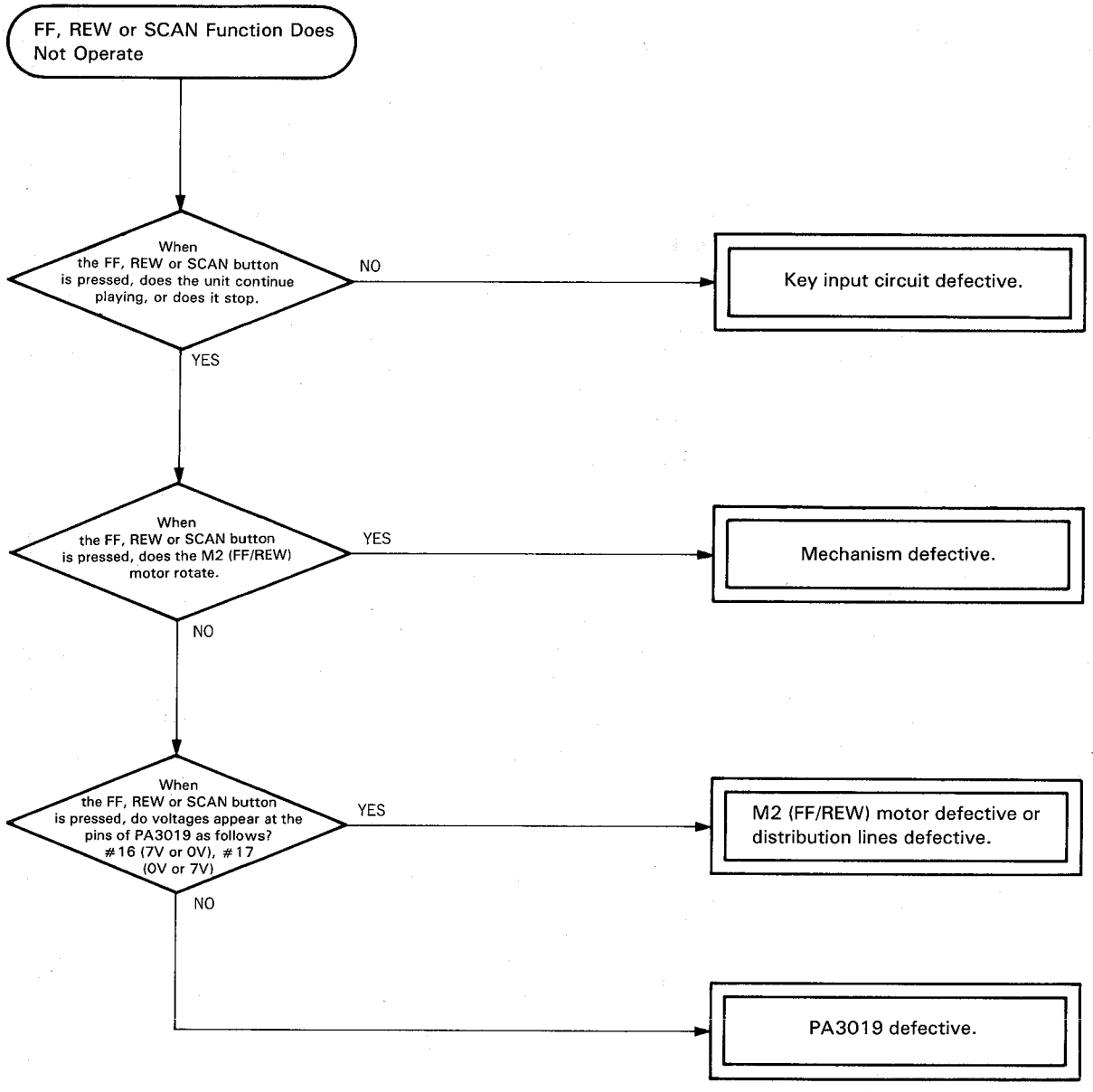
Fig. 9

6. TROUBLESHOOTING THE AUDIO SYSTEM (Fig. 9)

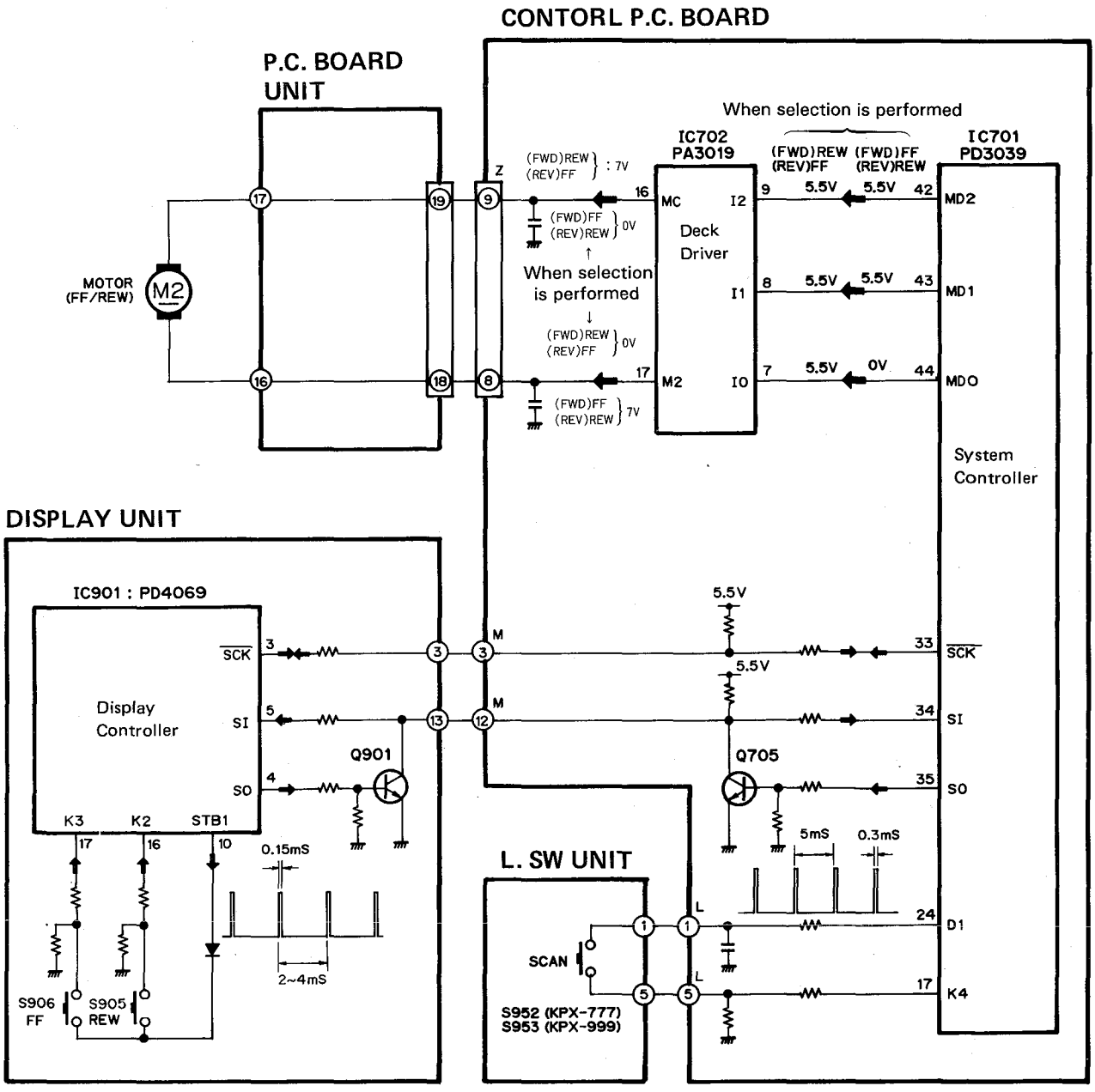
(PLAY operation is possible, but something is wrong in the audio system.)


No Sound, or Volume Cannot Be Adjusted
When the buttons on the door are pressed (FF, REW, DIR/REL etc.), does normal operation occur?
NO
Defect between #4 (SO) of PD4069 and collector of Q901.
Defect between #34 (SI) of PD3039 and R725.
YES
When the VOLUME (+) (−) buttons are pressed, does the indication on the display change?
NO
PD4069 key input circuit defective.
YES
When the VOLUME (+) (−) buttons are pressed, are #9 (CK), #10 (DATA), and #7 (ST) of TC9154P normal?
NO
Communication lines (bus) circuit defective
YES
Check the (+)B lines to each audio IC, and the operation of each IC.
Graphic equalizer curve does not change.
When the display button and CLEAR button are pressed, does the display indicate normally?
NO
PD4069 key input circuit defective.
YES
When the display is set to indicate frequency and the LEVEL button is pressed, are #22, #23, and #20 of TC9187N normal?
NO
Communication lines (bus) circuit defective.
YES
TC9187N or KHA206 defective.

7. TROUBLESHOOTING FOR FF, REW OR SCAN FUNCTION DOES NOT OPERATE (Fig. 10)


FF, REW or SCAN Function Does Not Operate
When the FF, REW or SCAN button is pressed, does the unit continue playing, or does it stop.
NO
Key input circuit defective.
YES
When the FF, REW or SCAN button is pressed, does the M2 (FF/REW) motor rotate.
YES
Mechanism defective.
NO
When the FF, REW or SCAN button is pressed, do voltages appear at the pins of PA3019 as follows? #16 (7V or 0V), #17 (0V or 7V)
YES
M2 (FF/REW) motor defective or distribution lines defective.
NO
PA3019 defective.

FF, REW, SCAN CONTROL CIRCUIT



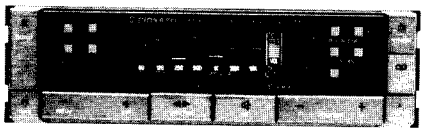
When voltage or waveforms are not specified, FWD•PLAY mode.

Fig. 10

PIONEER

Service Manual

H40



ORDER NO.
CRT1010

COMPONENT CAR STEREO EQUALIZER DECK

KPX-777 EW, ES

- **Cassette Mechanism Assembly**

See the Service Manual CX-156/A (CRT-468) when servicing the cassette mechanism assembly.

SPECIFICATIONS

General/Equalizer

Power source ..... 14.4V DC (10.8 – 15.6V allowable)
Grounding system ..... Negative type
Dimensions ..... 180(W)×50(H)×168(D) mm
Weight ..... 1.6 kg
Equalization frequency ..... 10 kHz, 3.5 kHz 1 kHz, 500 Hz 250 Hz, 125 Hz, 60 Hz
Equalization range ..... ±12 dB
Maximum output level ..... 200 mV
Output impedance ..... 1 kΩ

Tape player

Tape ..... Compact cassette tape (C-30 – C-90)
Tape speed ..... 4.76 cm/sec. (+0.14 cm/sec., —0.05 cm/sec.)
Fast forward/rewind time ..... Approx. 100 sec. for C-60
Wow & flutter ..... 0.09% (WRMS)
Frequency response ..... Metal: 30 – 20,000 Hz (±3 dB)
Normal: 30 – 17,000 Hz (±3 dB)
Stereo separation ..... 45 dB
Signal-to-noise ratio ..... Dolby NR IN: 63 dB (IEC-A network)
Dolby NR OUT: 55 dB (IEC-A network)

Note:
Specifications and the design are subject to possible modification without notice due to improvements.

- **Dolby and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation.**
- **Noise Reduction System manufactured under license from Dolby Laboratories Licensing Corporation.**

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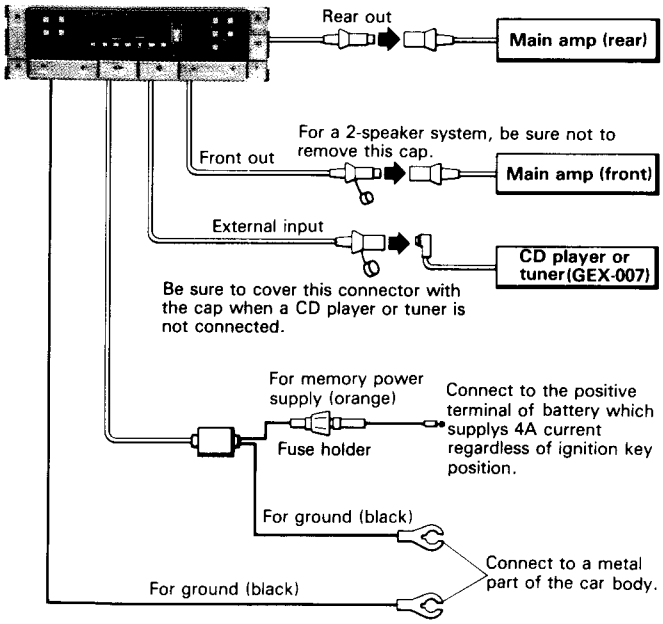
1. CONNECTION


Rear out
Main amp (rear)
For a 2-speaker system, be sure not to remove this cap.
Front out
Main amp (front)
External input
CD player or tuner(GEX-007)
Be sure to cover this connector with the cap when a CD player or tuner is not connected.
For memory power supply (orange)
Connect to the positive terminal of battery which supplys 4A current regardless of ignition key position.
Fuse holder
For ground (black)
Connect to a metal part of the car body.
For ground (black)

- Be sure to use the parts supplied and install the unit securely. If parts other than those supplied (specified) are used, they may loosen or damage internal parts.
- Be sure to install the unit in places where the driver is not bothered and where there is no danger of passengers being injured in case of sudden stops.
- When installing the unit into a DIN size space in the dashboard, use a separately available AD-G712 installation kit.
- Be sure to consult your dealer before making any holes in the car.

For 2-speaker systems, wire the rear output cord to the main amp.

Fig. 1

QUESTIONNAIRE MODEL _____

One Model per questionnaire

Dear Servicer,

Thank you for your cooperation in the post-sale service of Pioneer products.

This questionnaire is used as a tool to improve the serviceability of our products and service manuals. Please evaluate this model and service manual by answering the following questions. Your ideas may be realized in our future products. Your answers will be appreciated. Thank you.

PIONEER ELECTRONIC CORP.

T. Nakagawa, Manager, Service Section, International Division

1. SERVICING EVALUATION	Circle applicable number:	Good		Fair		Poor
a. Disassembly/Re-assembly:		1	2	3	*4	*5
b. Circuit Checks:		1	2	3	*4	*5
c. Replacement of Parts:		1	2	3	*4	*5
d. Adjustment (s):		1	2	3	*4	*5

* If (4) or (5) was circled, please be specific.

e. Your advice, opinion or ideas related to servicing this product.

2. SERVICE MANUAL EVALUATION

a. Circuit & Mechanism Description

b. Circuit Diagram

3. OTHER

Please describe other areas of servicing which you may find difficult.

Completed by : Date :

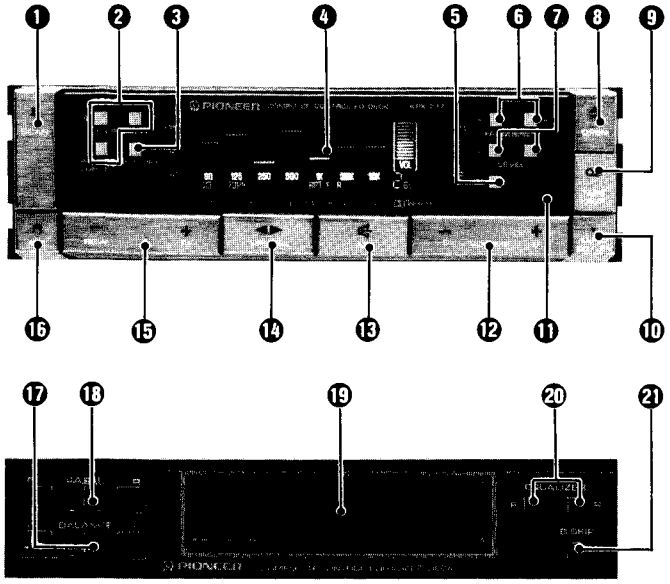
Company Name :

Address :

City/State/Zip :

Please send this form filled to the distributor in your country.

2. NOMENCLATURE and USE



Flip-Down Control Panel Section

Fig. 2

❶ Music Scan Button

Press to sequentially play the first 12 seconds of each successive selection on the tape. Press the release button to return to normal playback at any point.

❷ Equalizer Preset Buttons

Press to recall the equalizer curves preset to buttons 1 and 2. Pressing the PRESET CURVE button returns the unit to the factory preset curve.

❸ Memory Button

❹ Display

❺ Dolby NR Button

Press when playing a tape recorded with a Dolby NR. (DD appears on the display).

❻ Frequency Buttons

Press to change the frequencies of the graphic equalizer. Pressing the (+) button moves to the next higher frequency, while pressing (−) moves to the next lower frequency. The frequency flashes for 10 seconds after it is selected.

❼ Level Buttons

Press to set the graphic equalizer frequencies to the desired levels. During the period that the frequency is flashing (see ❻ above), pressing (+) raises the level, while pressing (−) lowers the level.

❽ Open/Eject Button

Press this button and the flip-down control panel opens. Press the button once more to eject the cassette.

❾ Tape Power Switch

Press to stop the play of a selection. Pressing again will supply power and cause the tape to continue from the position at which it stopped. The tape power switch should be left OFF when the unit is used with a separately available CD player or tuner.

❿ Display Button

Press to switch the display from tape transport, to graphic equalizer, to level indicator.

⓫ Clear Button

Press this button with a pointed object if the tape running should by chance malfunction (incorrect display, etc.). After several seconds, tape running will return to normal.

⓬ Volume Button

Press the (+) side to increase the volume and the (−) side to decrease the volume. Each press of the button changes the volume to the next level (29 total). Holding the button down will successively increase/decrease volume.

⓭ Attenuator Button

Press this button and volume level decreases instantaneously to 1/10 of the original volume. Press the button again and volume returns to the original level.

⓮ Program/Release Button

Press to switch from Side A to Side B of a tape or vice versa. Also used to cancel music scan, search, repeat, fast forward and rewind.

⓯ Fast Forward Button (+)/Rewind Button (−)

Press the (+) side for fast forward or the (−) side for rewind. For music search, press this button twice.

⓰ Music Repeat Button

Press to repeat the selection currently being played. Press the repeat button again or the release button to cancel the repeat function.

⓱ Balance Control

⓲ Dual Amp Balancer Control

Used for volume control of the front and rear speakers in 2-amp, 4-speaker systems. Setting to F results in sound from the front speaker only, while setting to R results in sound from the rear speaker only.

⓳ Tape Slot

⓴ Equalizer Front/Rear Buttons

Press either button to apply the equalizer effect to the corresponding speakers (F or R appears on the display to indicate the button pressed). Pressing both buttons applies the equalizer to both front and rear speakers.

㉑ Blank Skip Button

Press to skip blanks longer than 12 seconds between selections (B.SKIP appears on the display). This function is especially useful when advancing from the end of one side of a tape to the beginning of the other side.

- All the press type control buttons have an electronic sound (beep) and display for dual confirmation of operation.
- Noise reduction manufactured under license from Dolby Laboratories Licensing Corporation. "Dolby" and the double-D symbol are trade marks of Dolby Laboratories Licensing Corporation.
- Since an oil damper is used for the flip-down control panel, temperature and/or installation angle may effect the time required for opening and closing.
- The level indicator displays show the music signal only. Changes in the volume level do not effect the levels.

3. READING the DISPLAYS

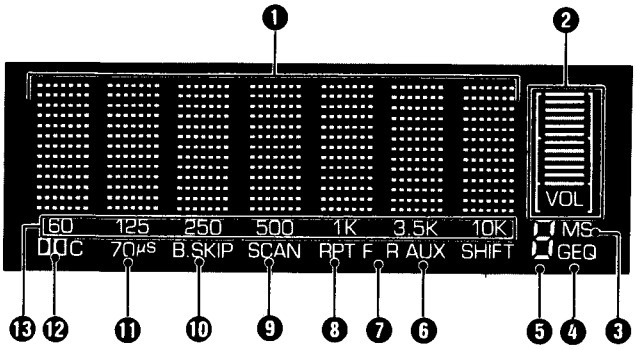


Fig. 3

❶ Tape Transport/Graphic Equalizer/Level Indicator

Each press of the display button causes the display to change as shown in A, B, and C below.

A: Tape Transport Display

= moving from the left to the right of the display indicates normal tape transport. When tape transport is reversed, = moves from right to left. The respective indicators increase in speed for such functions as fast forward, reverse, and music search.

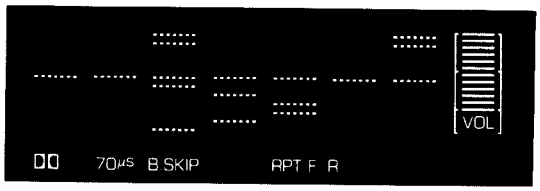


Fig. 4

B: Graphic Equalizer Display

Levels are shown divided among seven frequencies. Yellow indicates flat, red indicates high and blue indicates low levels.

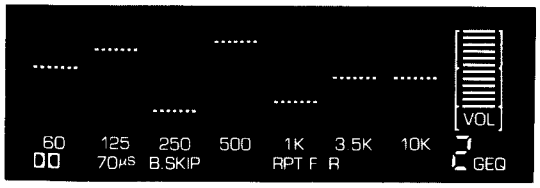


Fig. 5

C: Level Indicator Display

The left and right sides show the levels for the respective left and right channels.

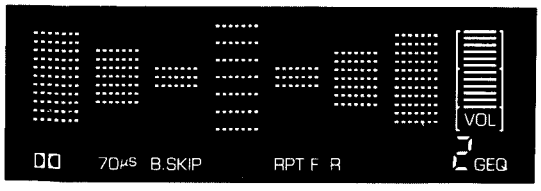


Fig. 6

❷ Volume Level/Attenuator Display

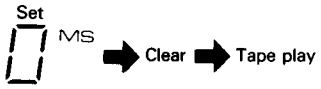
Volume level is shown. The lower two levels are always indicated no matter how low the volume is set. The volume level display blinks when the attenuator button is pressed. The volume level while the display is blinking is 1/10 that of the original volume.

❸ Music Search Display

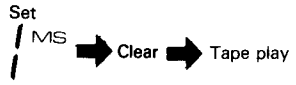
MS appears on the display during music search.

- The display changes as shown during music search:

Locating the beginning of the current selection



Locating the beginning of the following selection



❹ Graphic Equalizer Display

The preset number lights together with the graphic equalizer display when an equalizer preset button is pressed. This display is cleared when the tape transport display is shown.

❺ Music Search Number/Equalizer Preset Number Display

0 is displayed when searching for the beginning of the current selection, and 1 is displayed when searching for the next selection. The preset number (1, 2) is displayed when an equalizer preset button is pressed.

❻ External Input Display

Lights when a unit (CD player or tuner) connected through the external input connector is in operation while the cassette deck is OFF.

❼ Equalizer Front/Rear Display

Lights when the equalizer button is pressed.

❽ Music Repeat Display

Lights when the music repeat button is pressed. The music repeat function is in operation while this indicator is lit.

❾ Music Scan Display

Lights when the music scan button is pressed. The music scan function is in operation while this indicator is lit.

❿ Blank Skip Display

Lights when the blank skip button is pressed.

⓫ 70μs Tape Display

An automatic tape selector will switch the equalization (70μs/120μs) when a cassette tape is loaded into the unit. A 70μs tape will cause 70μs to be displayed, while a 120μs tape will result in no display at all.

⓬ Dolby NR Display

DO will light when the Dolby NR button is pressed.

⓭ Frequency Display

Lights during the graphic equalizer display.

4. PLAYBACK

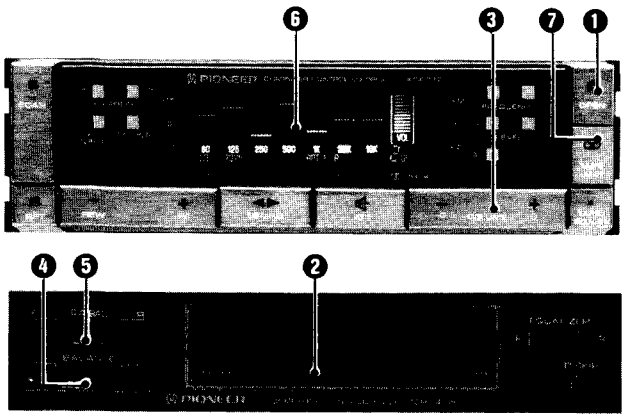


Fig. 7

1. With the ignition switch in the ON or ACC position, press the open button ❶ and the flip-down control panel will open.
2. Insert a cassette tape into the tape slot ❷. The deck will automatically set the tape and begin playback.
3. Adjust the volume ❸, balance ❹, and dual amp balancer ❺ (for 4-speaker systems) to the desired levels.
4. Close the flip-down control panel ❻.
5. To stop a tape, press the tape power switch ❼. Press the switch again, and play will begin at the place where it was stopped.
6. To remove a tape, press the open/eject button ❶ and the flip-down control panel will open. Press the button once more and the cassette will eject.

- The cassette tape will automatically be ejected after a few seconds if it fails to be set. Reinsert the tape and try to set it again.

5. USING the GRAPHIC EQUALIZER

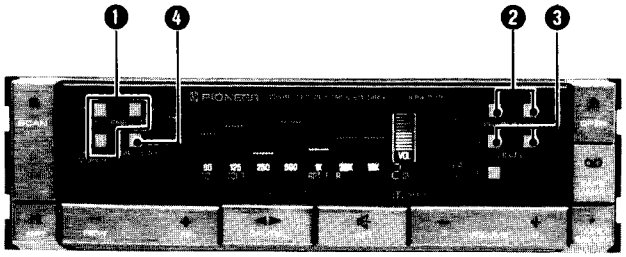


Fig. 8

Factory Preset Curve

Rear Speaker Equalizer Curve

Pressing the preset curve button (PRESET CURVE) ❶ will produce an equalizer curve compensated for vehicle interior frequency characteristics. This compensation curve is set to produce flat characteristics in most types of vehicles.

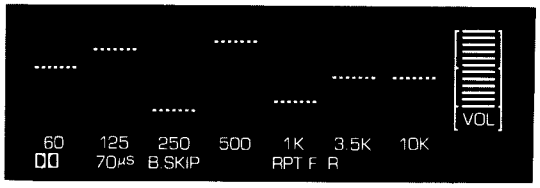


Fig. 9

Forming Equalizer Curves

1. Use the frequency buttons ❷ to select the frequency to be adjusted.
2. The frequency display will flash for approximately 10 seconds. During this time, use the level buttons ❸ to adjust the level of the frequency.

- Repeat steps 1 and 2 to set the levels of the other frequencies.
- To produce an equalizer curve that is close to a factory preset curve, it is easier to call up the factory preset curve and make modifications.

Storing Curves in Memory

Once an equalizer curve is formed, it can be stored in a preset memory by following the procedures outlined below:

3. Press the memory button ❹ (all level indicators will flash for approximately 5 seconds).
4. Press one of the equalizer preset buttons ❶ while the level indicators are flashing.

- The procedures outlined above can be used to preset two equalizer curves.

Note:

- If the program source does not include components in the vicinity of 60Hz, or if small diameter speakers are used, little change will be noticeable even if the 60Hz frequency level is adjusted.

6. PARTS LOCATION

NOTE

- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ : GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

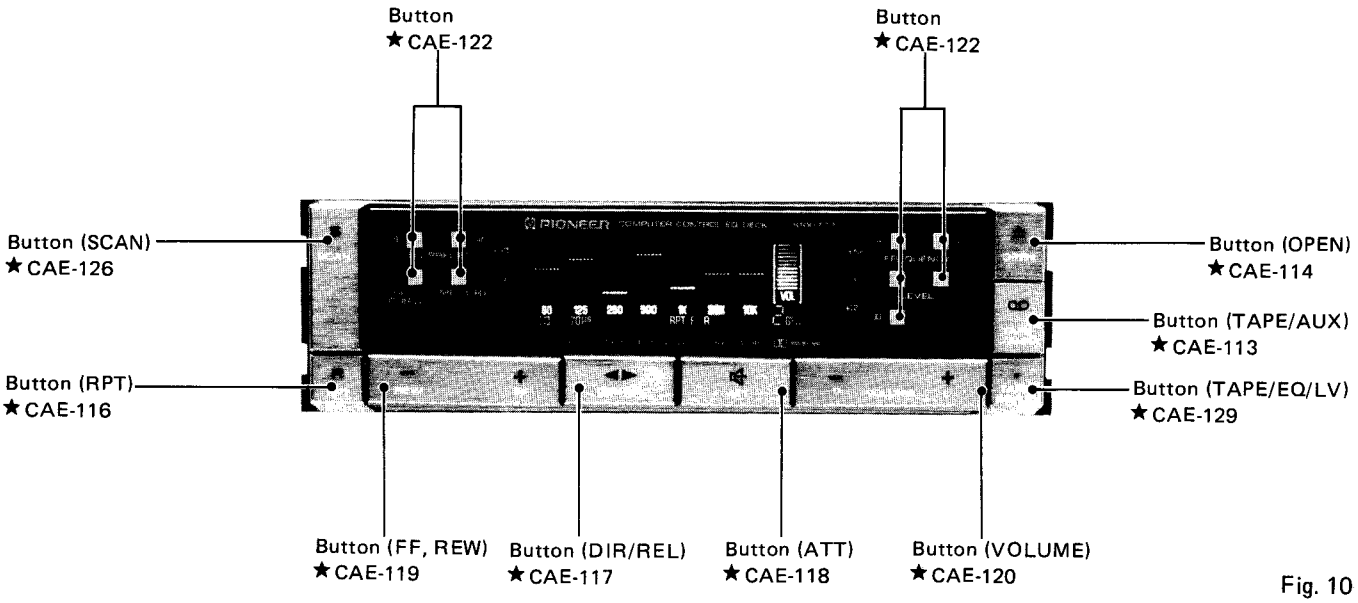


Fig. 10

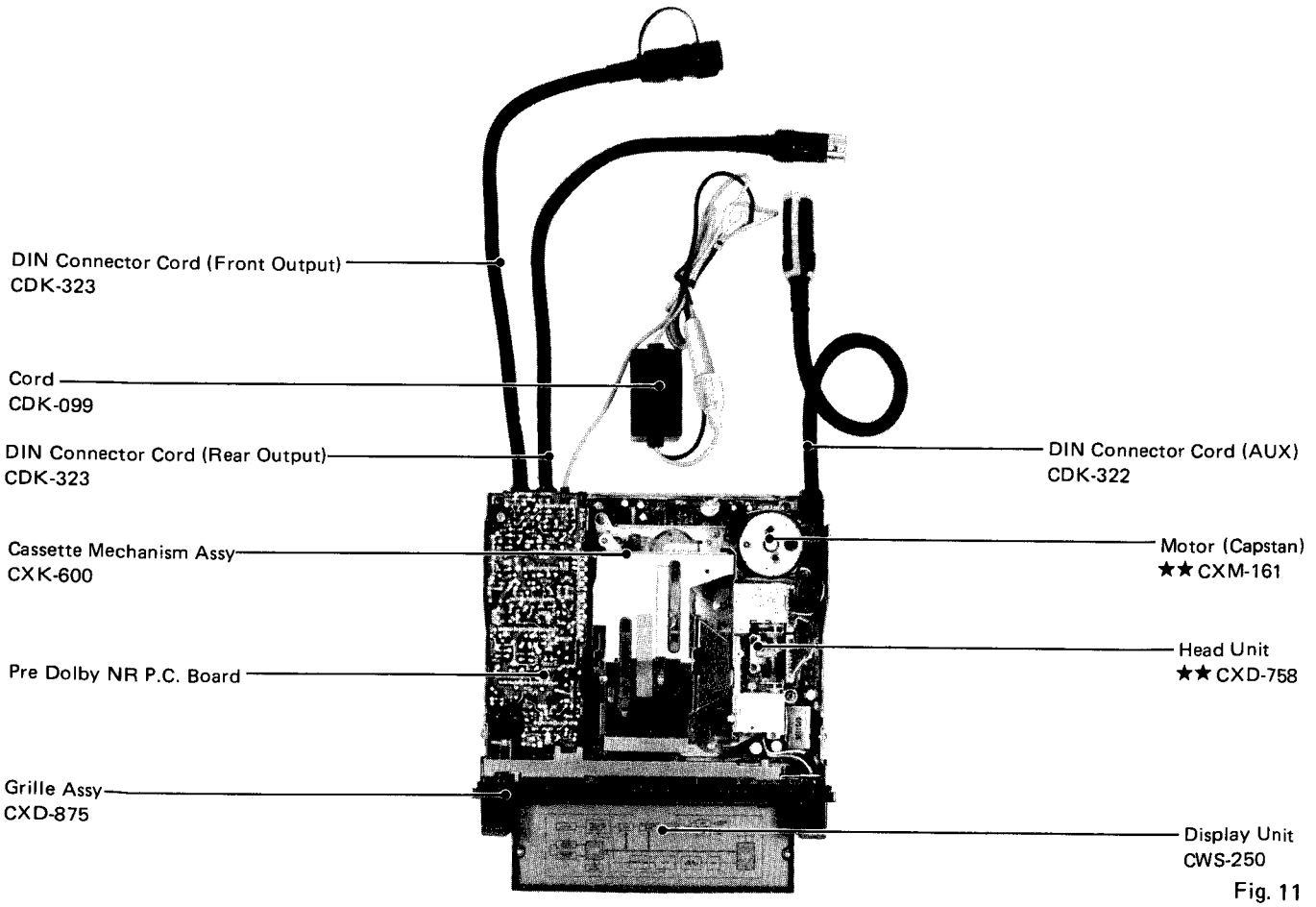


Fig. 11

7. DISASSEMBLY

- **Removal of Top Case (Fig. 12)**

1. Remove the 4 mounting screws, then lift up the top case.

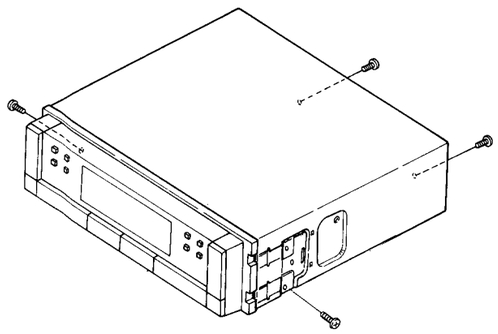


Fig. 12

- **Removal of Cassette Mechanism Assembly (Fig. 13)**

1. Remove the 4 mounting screws, then remove the cassette mechanism assembly.

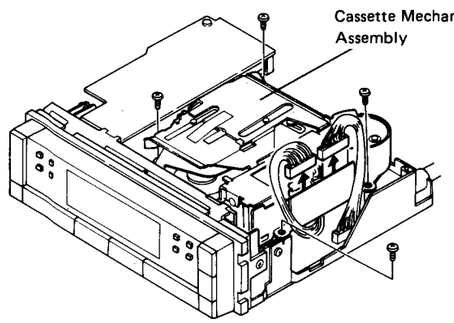


Fig. 13

- **Removal of Chassis Unit (Fig. 14)**

1. Remove the 4 mounting screws labeled (A), then remove the chassis unit.

- **Removal of Pre-Dolby NR PCB (Fig. 14)**

1. Remove the mounting screws labeled (B).
2. Lift up the Pre-Dolby NR PCB and disconnect the connectors (indicated by the arrows) from the control PCB.

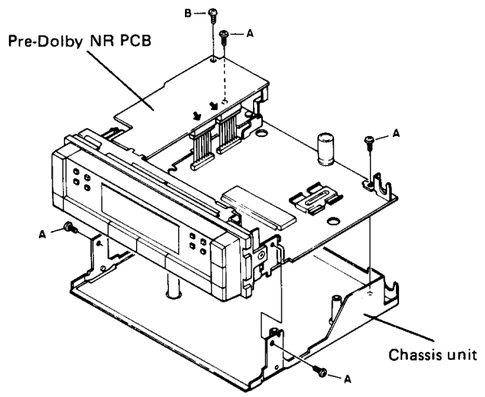


Fig. 14

- **Removal the Grille Assembly (Fig. 15)**

1. Remove the 2 mounting screws, detach the soldered connections indicated by arrows, then remove the grille assembly.

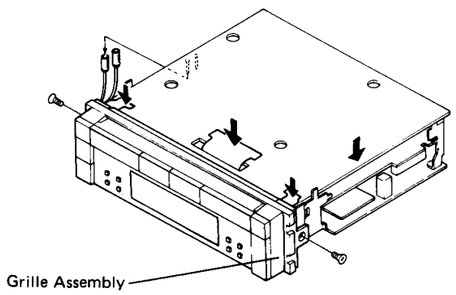


Fig. 15

- **Removal of R. Switch Unit (Fig. 16)**

1. Remove the 2 mounting screws, then remove the damper unit.
2. Remove the 2 mounting screws, then remove the right switch unit.

- **Removal of L. Switch Unit (Fig. 16)**

1. Remove the 2 mounting screws, then remove the solenoid unit.
2. Remove the 2 mounting screws, then remove the left switch unit.

- **Removal of Display Unit (Fig. 16)**

1. Remove the 2 mounting screws, then remove the holder.
2. Remove the display unit.

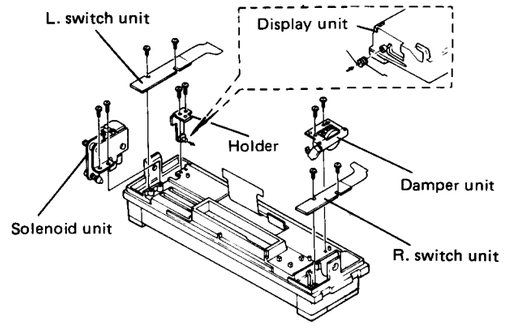


Fig. 16

- **Removal of Display PCB (Fig. 17)**

1. Remove the 2 mounting screws labeled (C), then remove the plate.
2. Remove the 3 mounting screws labeled (D), then remove the cover and display PCB.

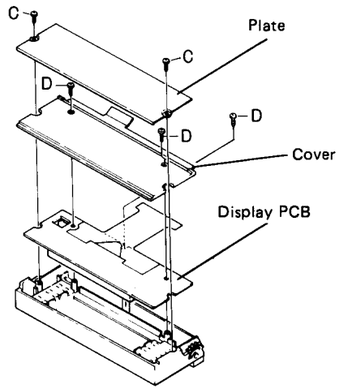


Fig. 17

8. CIRCUIT DESCRIPTION

- **Block Diagram**

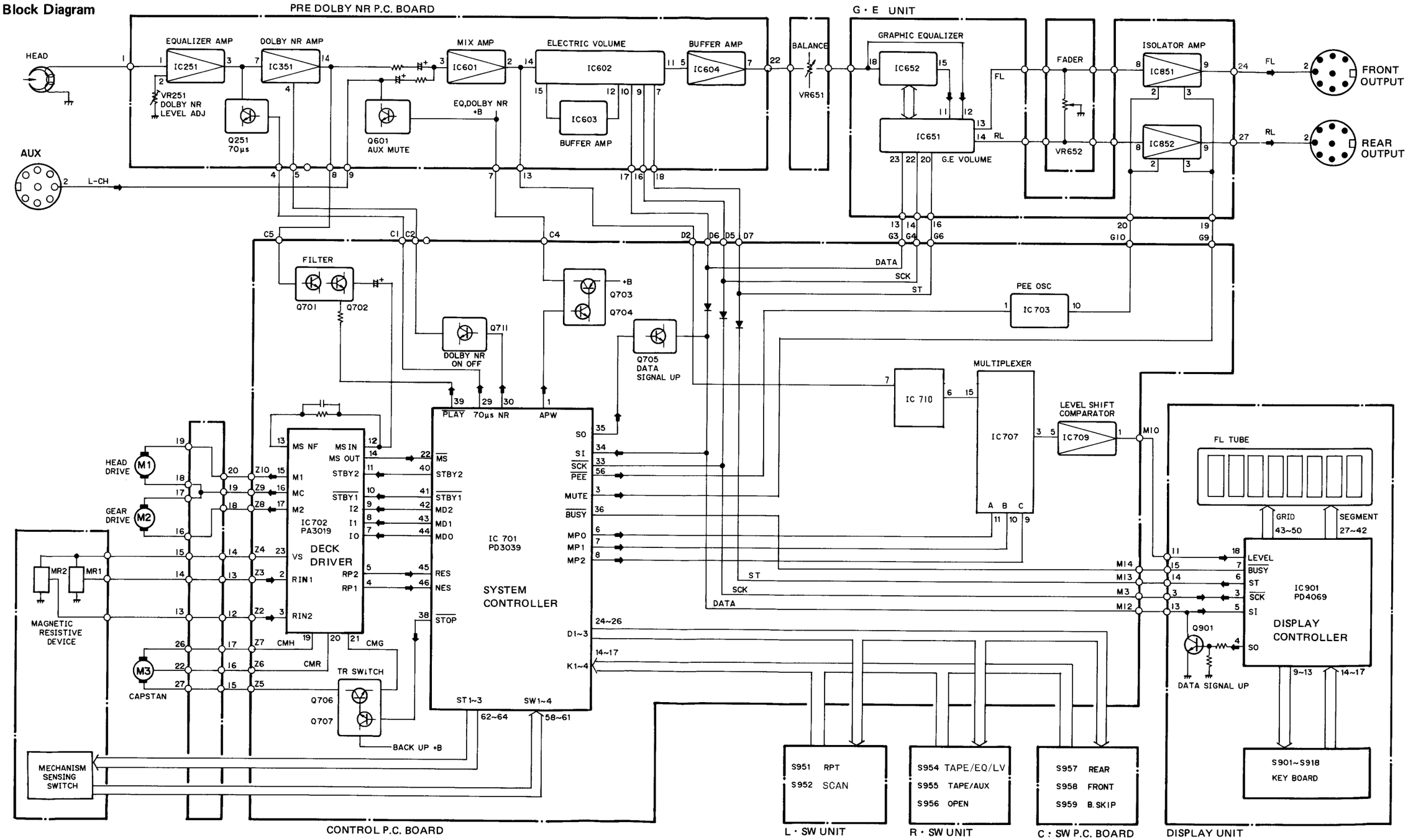


Fig. 18

● +B Block Diagram

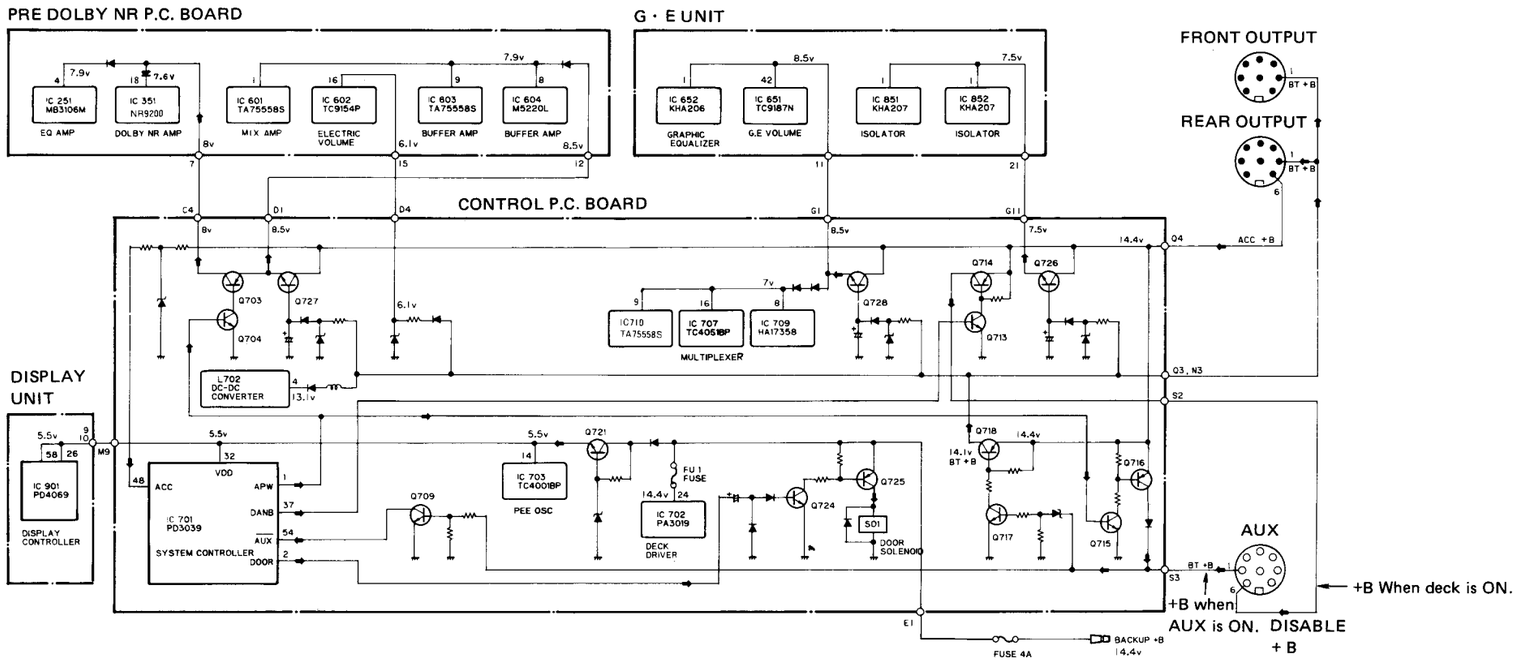


Fig. 19

● Level Diagram

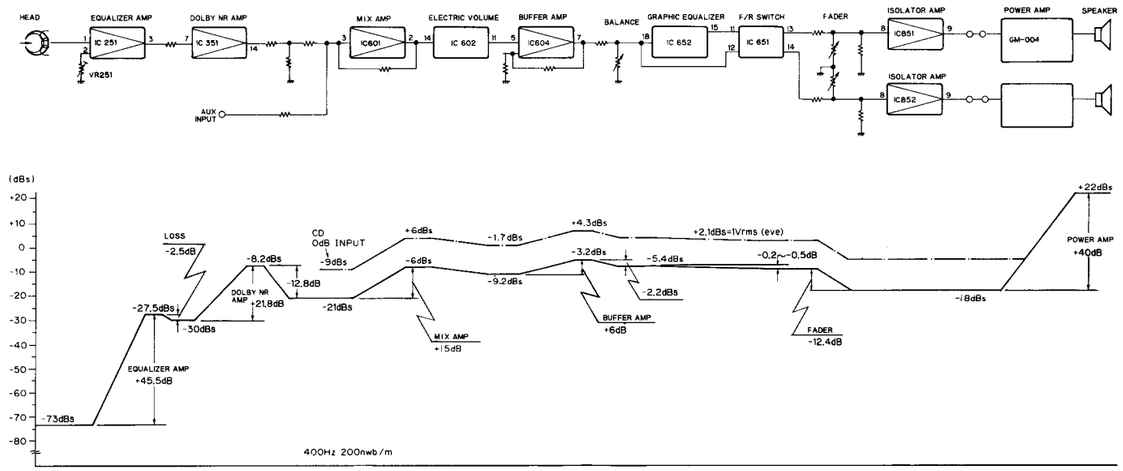
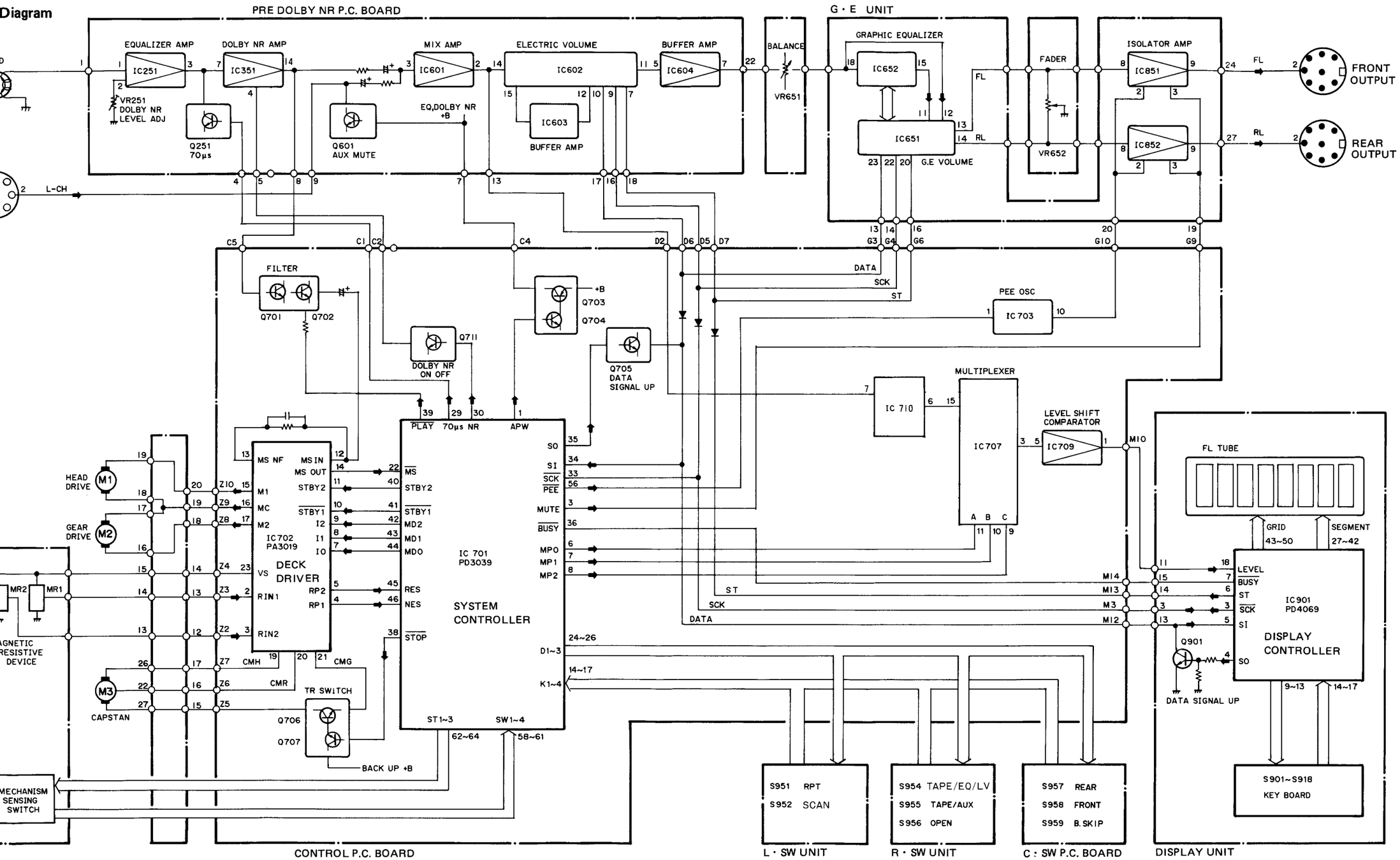


Fig. 20

CUIT DESCRIPTION

Diagram



Refer to the command code on page 15.

:901
isplay
FF

Display OFF request

ommand code
'H)
VR DATA)
/R DATA
laximum
tenuation)

The attenuation amount of the electronic volume control is set at maximum.

nfirm (ACK)
nfirm (ACK)

This transaction must be executed twice.

Fig. 18

• System Outline

The system controller (IC701: PD3039) and display controller (IC901: PD4069) are connected by 8-bit serial data transmission. The electronic volume (IC602: TC9154P) and graphic equalizer electronic volume (IC651: TC9187N) are also connected to this line.

When the system enters in the TAPE or AUX mode, the system controller begins communication and enables the display controller, then the display starts to operate. In normal communication, the system and the display controller become the talker alternately to communicate with each other. The system controller detects any abnormal conditions in communication and initializes communication. The display controller creates and outputs data required by the electronic volume and graphic equalizer electronic volume. The data bus to the electronic volume and graphic equalizer electronic volume is controlled by pin 57 in the system controller VDT, enabling the bus only when necessary.

• Serial Data Communication of System Controller

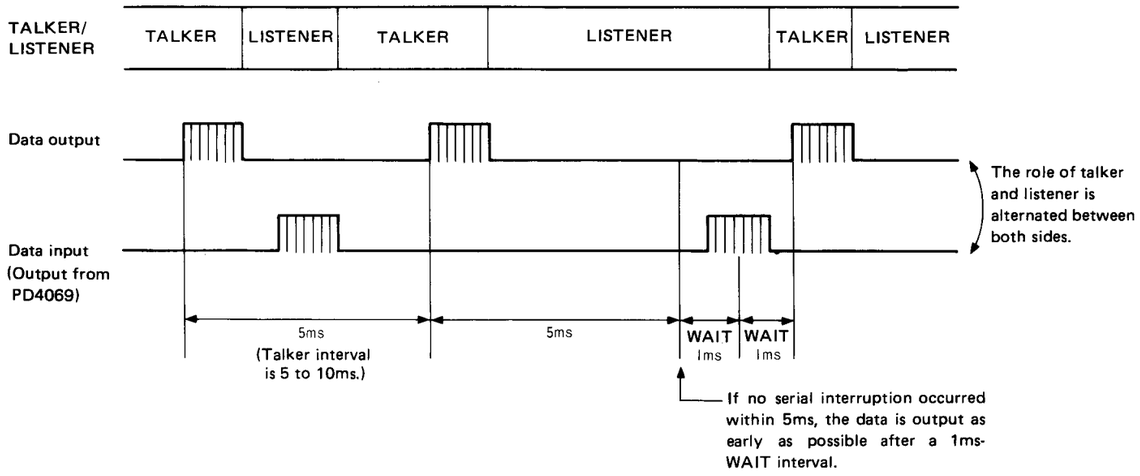


Fig. 24 Communication Timing Chart of System Controller

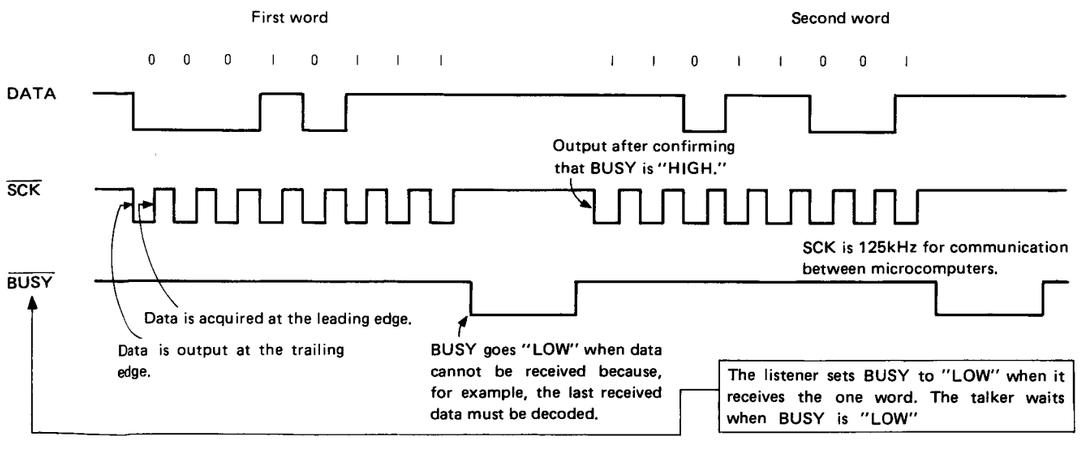
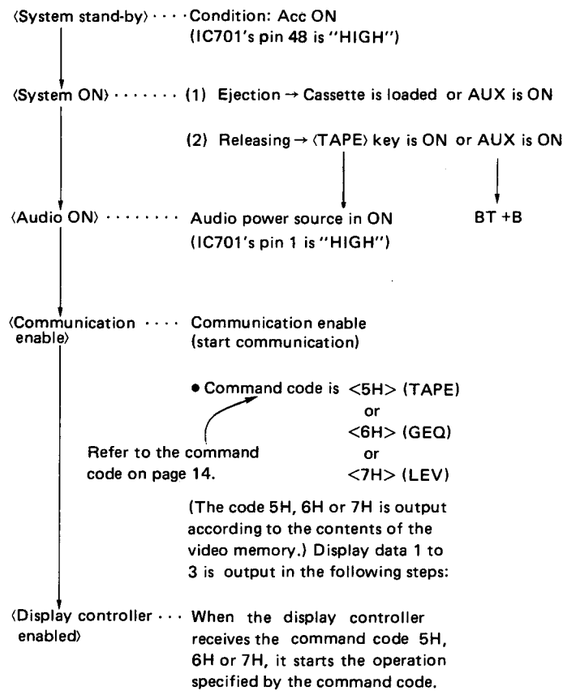

First word
Second word
0 0 0 1 0 1 1 1
1 1 0 1 1 0 0 1
DATA
SCK
BUSY
Output after confirming that BUSY is "HIGH."
SCK is 125kHz for communication between microcomputers.
Data is acquired at the leading edge.
Data is output at the trailing edge.
BUSY goes "LOW" when data cannot be received because, for example, the last received data must be decoded.
The listener sets BUSY to "LOW" when it receives the one word. The talker waits when BUSY is "LOW"

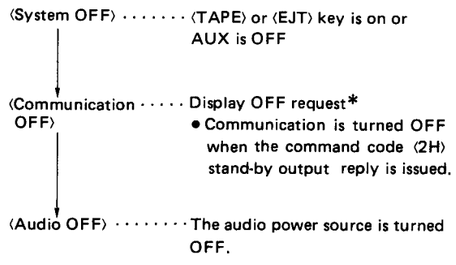
Fig. 25 Data Acquisition

○ Data Communication Procedure

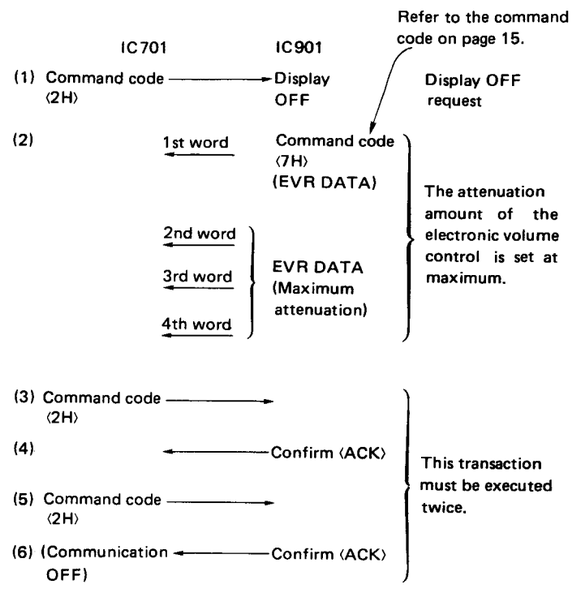
1) Data Communication Start


⟨System stand-by⟩ · · · · Condition: Acc ON (IC701's pin 48 is "HIGH")
⟨System ON⟩ · · · · · · · (1) Ejection → Cassette is loaded or AUX is ON
(2) Releasing → ⟨TAPE⟩ key is ON or AUX is ON
⟨Audio ON⟩ · · · · · · · · Audio power source in ON (IC701's pin 1 is "HIGH")
BT +B
⟨Communication enable⟩ · · · · Communication enable (start communication)
• Command code is <5H> (TAPE) or <6H> (GEQ) or <7H> (LEV)
Refer to the command code on page 14.
(The code 5H, 6H or 7H is output according to the contents of the video memory.) Display data 1 to 3 is output in the following steps:
⟨Display controller enabled⟩ · · · When the display controller receives the command code 5H, 6H or 7H, it starts the operation specified by the command code.

2) Data Communication Ends


⟨System OFF⟩ · · · · · · · ⟨TAPE⟩ or ⟨EJT⟩ key is on or AUX is OFF
⟨Communication OFF⟩ · · · · · Display OFF request*
• Communication is turned OFF when the command code ⟨2H⟩ stand-by output reply is issued.
⟨Audio OFF⟩ · · · · · · · · The audio power source is turned OFF.

*Communication OFF



● +B Block Diagram

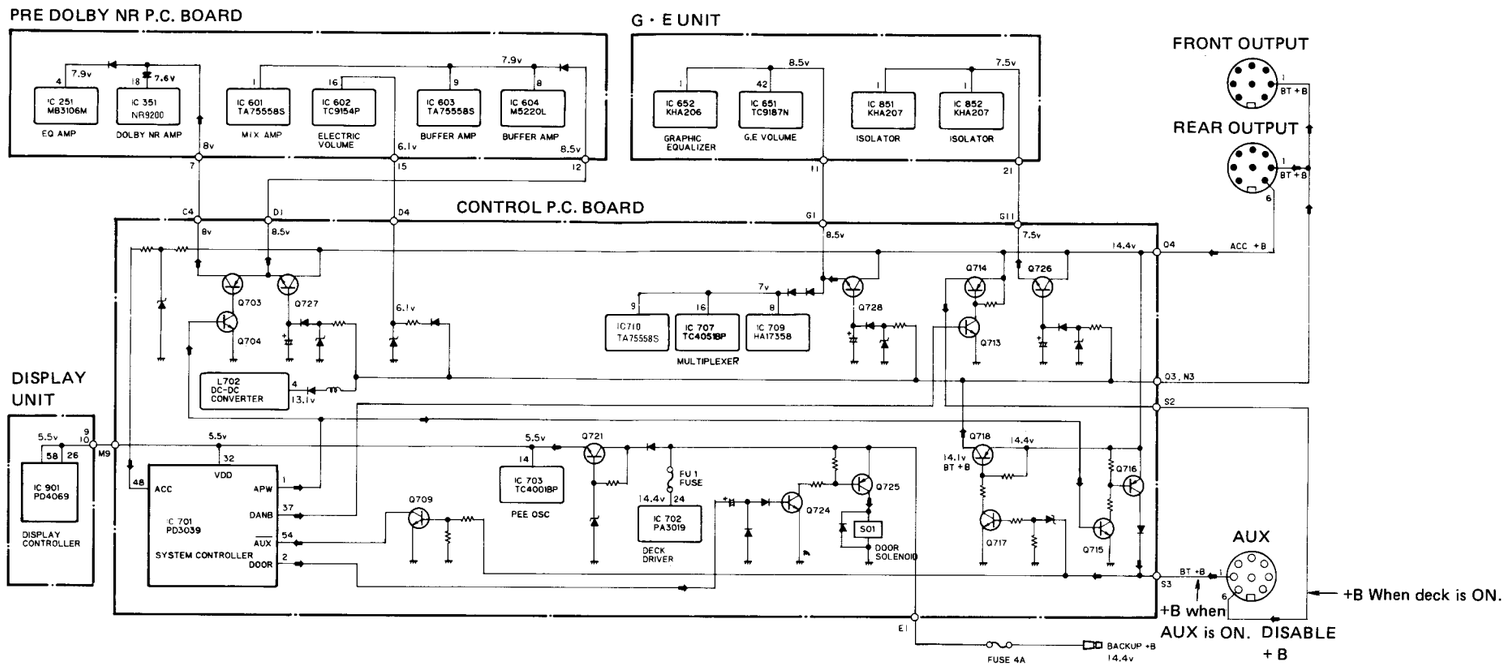


Fig. 19

● Level Diagram

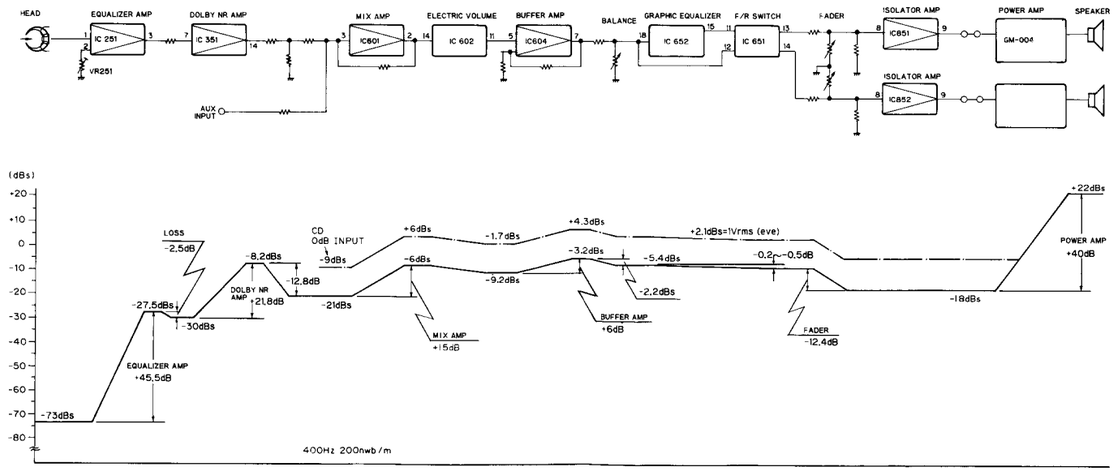
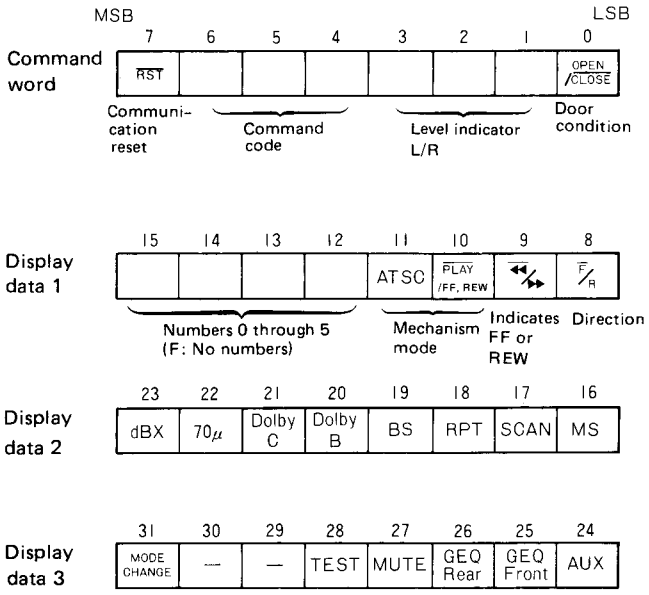


Fig. 20

○ **Output Data Format (Output from system controller)**

Usually the system controller outputs only 8-bit command words but when the controller outputs the command code 5H, 6H or 7H, a 3-word display data follows the command. On receiving the command 5H, 6H or 7H, the display controller begins to operate.



Command code (4 to 6th digits-hexadecimal)

Code	Command	Code	Command
0H	—	4H	—
1H	—	5H	Indicates TAPE
2H	Stand-by	6H	Indicates GEQ
3H	—	7H	Indicates LEV

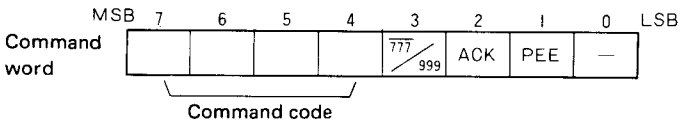
H indicates hexadecimal.

Function of Output Data Bits

Bit	Item	Contents
0	OPEN/$\overline{\text{CLOSE}}$	1: Door is open 0: Door is closed
1 – 3	Level indicator	Level indicator L/R Currently selected channel number is output and synchronized with the switching of the multiplexer (IC707). 0H: OFF 4H: R ch 7H: L ch
4 – 6	Command code	2H: Stand-by . . . . Display OFF request. Output when TAPE and AUX is OFF 5H: TAPE . . . . . TAPE request 6H: GEQ . . . . . GEQ request 7H: LEV . . . . . Level indicator request
7	$\overline{\text{RST}}$	Norm is 1. This bit is used to initialize the communication line when communication error occurs. • When resetting the communication circuit, the command word bits (8 bits) are all 0.
8	$\bar{F}$/R	Tape direction (0: Forward, 1: Reverse)
9	$\overline{◀◀}$/▶▶	Fast forward/rewind indication 0: REW in the forward mode or FF in the reverse mode 1: FF in the forward mode or REW in the reverse mode
10	$\overline{\text{PLAY}}$/FF,REW	0: Play 1: FF, REW
11	ATSC	1: ATSC 0: Others
12 – 15	Numbers 0 through 5	Indicates numbers 0, 1, 2, 3, 4 and 5. FH: Numbers not indicated

Bit	Item	Contents
16	MS	These bits are set to 1 when the corresponding modes are selected.
17	SCAN	
18	RPT	
19	BS	
20	Dolby B	
21	Dolby C	
22	70μ	
23	dBX	
24	AUX	
25	GEQ Front	
26	GEQ Rear	
27	MUTE	Set to 1 when MUTE is selected. Request the maximum attenuation of the electronic volume control.
28	TEST	Set to 1 when the test mode (reduced timer mode) is selected.
29, 30	–	
31	MODE CHANGE	Set to 1 to enable the mode to change automatically. (Example: Changing tape direction at tape end.)

• Input Data Format (Output from Display Controller)



Command Code (bits 4-7 – Hexdecimal)

Code	Command	Code	Command
0H	–	8H	Set GEQ DATA
1H	DIR/REL key	9H	Set EVR, GEQ DATA
2H	FF key	AH	Set all polling GEQ DATA
3H	–	BH	–
4H	REW key	CH	–
5H	Dolby B key	DH	–
6H	Dolby C key	EH	–
7H	Set EVR DATA	FH	–

EVR: Electronic volume (IC602)

Function of Input Data Bits

bit	Item	Contents
0	–	
1	PEE	Key sound request
2	ACK	After receiving a stand-by request (command code = 2H), the display controller returnes ACK. When ACK is not detected, stand-by request is repeated.
3	$\overline{777}$/999	KPX-777 : 0
4 – 7	Command code	(see table below)

1H	DIR/REL key	• Set when a key is pressed • When any of these codes is received the controller recognizes which corresponding key is being pressed.
2H	FF key	
4H	REW key	
5H	Dolby B key	
6H	Dolby C key	
7H	Set EVR DATA	1: Ignores the 3-byte input data that follows.
8H	Set GEQ DATA	2: Ignores the 2-byte input data that follows.
9H	Set EVR, GEQ DATA	3: Ignores the 5-byte input data that follows.
AH	Set all polling GEQ DATA	4: Ignores the 14-byte input data that follows.

The display controller issues the code 7H through AH when it outputs data to the electronic volume or graphic equalizer. After recording the received command, the system controller ignores a decided number of data bites.

• MS Circuit

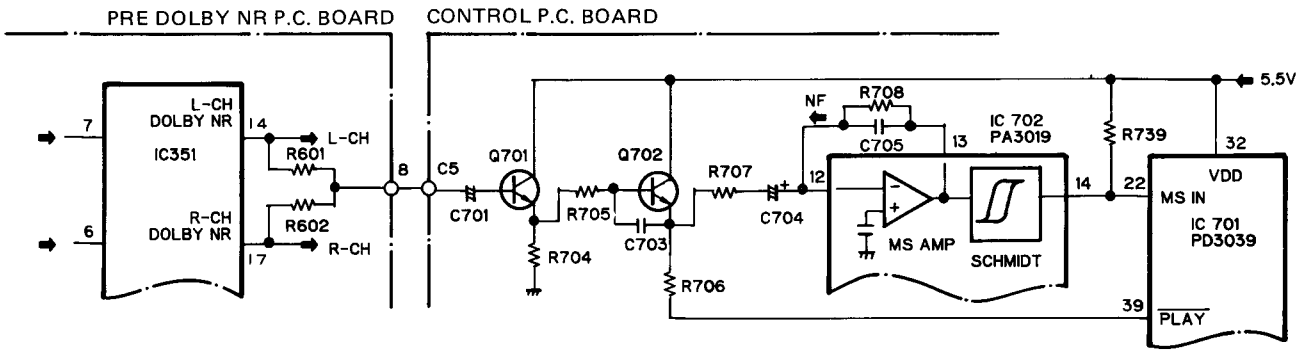


Fig. 23

The MS circuit detects blank spots on the tape. It consists of a filter, a differential MS amplifier (inside IC702), and a Schmitt comparator (inside IC702). The non-inverted input pin on the MS amplifier is fixed at a standard voltage inside the IC, and the inverted input pin is connected with the outside. The left and right output signals from the Dolby NR circuit are combined and transmitted to pin 12 of IC702 after passing through the filter circuit. Pulses are generated at the output pin of the Schmitt comparator when recorded music exceeds a minimum amplitude. Music selection is then carried out by IC701, which senses these pulses. The filter circuit switches between frequency response and gain when changing from the "Play" music selection mode to the "high speed" music selection mode.

1. **"Play" Music Selection (Equivalent circuit diagram 24):**
IC701 pin 39 goes "low", and Q702 go to the "on" position. Since Q702 is acting as an emitter follower at this time, its output impedance is sufficiently low compared with R707. The gain from either the left channel or the right channel to IC702 pin 13 is approximately 45 dB. The low range cut off frequency is approximately 300 Hz and the high range cut off frequency is approximately 7 kHz.

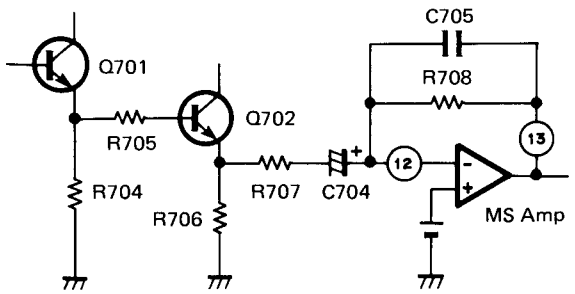


Fig. 24 Equivalent Circuit During "Play" Music Selection (Music Repeat, etc.)

2. **"FF" "REW" Music Selection (Equivalent circuit diagram 25):**
IC701 pin 39 goes "high", and Q702 go to "off." At this time, the gain is approximately 37 dB, the low range cut off frequency is approximately 4 kHz and the high range cut off is approximately 7 kHz.

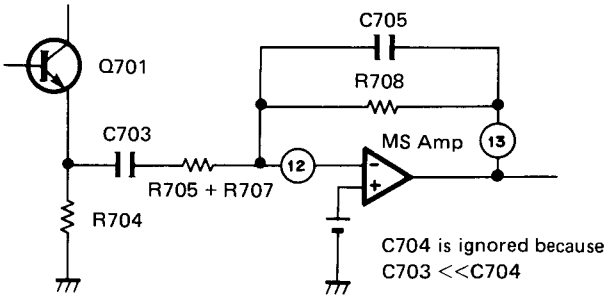


Fig. 25 Equivalent Circuit During the MS Mode

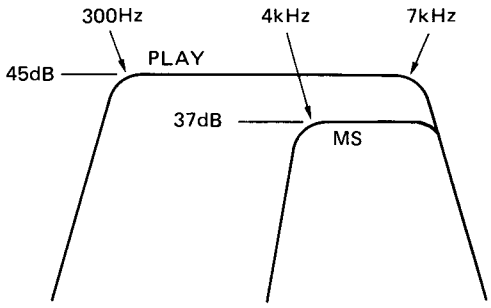


Fig. 26 Filter Characteristics

• Reel Unit Rotation Pulse Detection Circuit

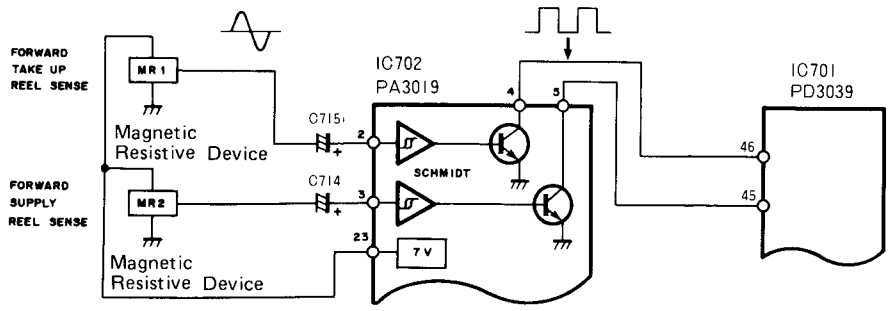


Fig. 27

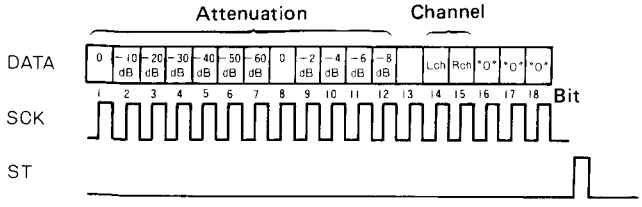
- A continuous-wave is transmitted by the magnetic resistive device (MR 1, MR 2) as the reel unit rotates. This signal is formed into a wave pattern in the Schmitt circuit within IC702, and a square wave is output from pins 4 and 5 (IC702) in synchronization with the rotation of the reel unit. When rotation stops, potential is fixed at 0 or 5 volts.

1. **Tape end detector:** When in the forward play mode, the forward take-up reel is monitored. When in the reverse play mode, the forward supply reel (reverse take-up reel) is monitored. When no pulse is detected for more than 1.2 seconds, the circuit senses that the tape has ended and changes the tape direction.
2. **ATSC:** While rewinding, when rotation of the reel unit on the side from which the tape is being supplied (the take-up side when in the forward play mode) is detected (8 pulses within 600 ms), the deck switches to the play mode.
3. **MS overrun compensator:** When a blank spot on the tape is detected when RMS (rewind music search) is engaged, a stop message is sent to the mechanism, but overrun occurs due to inertia in the cassette and in the reel unit. The length of this overrun (number of revolutions) is monitored, and after switching to the play mode, volume is muted until that length of tape is played. When FMS (fast forward music search) is engaged, the start of the next piece is detected. The deck then switches automatically to RMS, and the actions described above take place.

• Electronic Volume Control (Fig. 28)

○ Electronic volume control (IC602) is carried out by serial transmission of data from the system controller (IC901), allowing volume to be adjusted in 2 dB increments. The control signals from IC901 pin 4 (DATA), pin 3 (SCK) and pin 6 (ST) are as follows:

1. The data line transmits data concerning degree of damping and channel selection. This data is made up of 18 bits.
2. The SCK line is for the clock signal.
3. A strobe signal latches volume data by causing the ST Line to go "H."



○ **Muting**

When the audio signal is muted, the electronic volume control is set at minimum. Therefore, during music selection the signal is muted, and it does not reach the circuits that follow the electronic volume control. The muting circuit composed of IC851 and 852 prevents noise from entering the circuits between the electronic volume and graphic equalizer circuits.

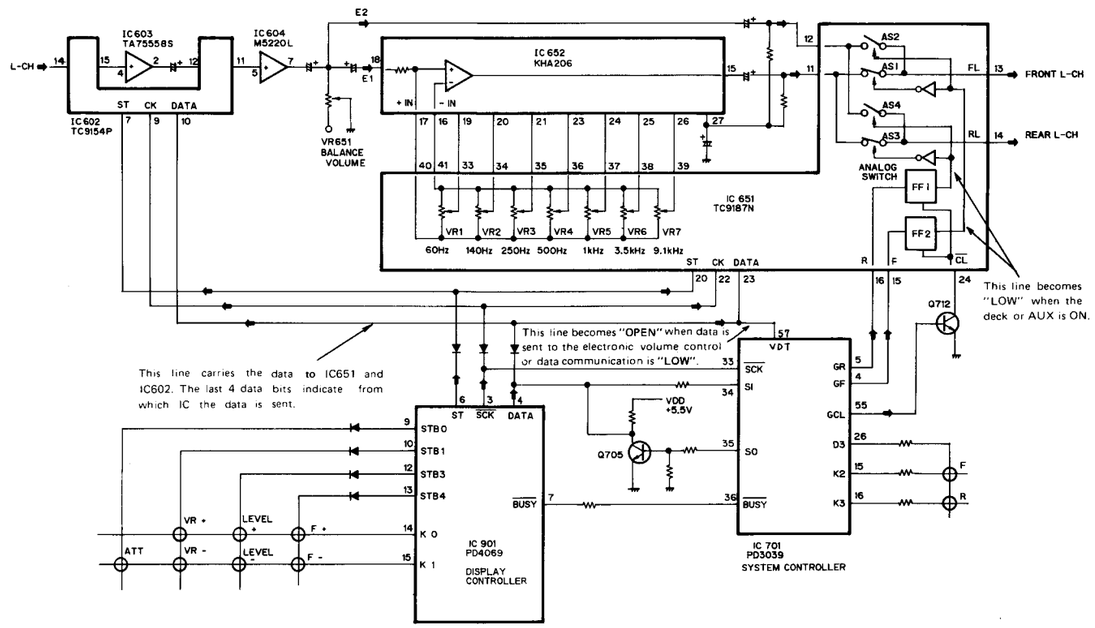


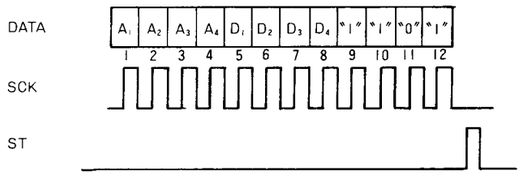
Fig. 28

● Graphic Equalizer Circuit (Fig. 28)

The signal from the balance volume control is divided into 2 signals, E1 and E2. E1 passes through the graphic equalizer while E2 does not. E1 is input to pin 18 of IC652, and each signal is divided into the proper frequency component. The signal level of each frequency component is controlled by the electronic volume control (IC651) of the graphic equalizer.

The electronic volume control level is set depending on the control data transmitted from the display controller (IC901) through a serial line.

The control data output from pin 4 (DATA), pin 3 (SCK) and pin 6 (ST) is shown in the following figure.



(1) The DATA line carries 12-bit data containing the amoung of attenuation and selected volume.

○ **A1 to A4 (1st to 4th bits)**

These bits determine which volume control (VR1 to VR7) is to be selected.

A1	A2	A3	A4	
H	L	L	H	VR 1
L	H	L	H	VR 2
H	H	L	H	VR 3
L	L	H	H	VR 4
H	L	H	H	VR 5
L	H	H	H	VR 6
H	H	H	H	VR 7

○ **D1 to D4 (5th to 8th bits)**

These bits determine the attenuation of the volume control selected by A1 to A4.

D1	D2	D3	D4	Step
L	H	H	L	+ 6 (+12dB)
H	L	H	L	+ 5 (+10dB)
L	L	H	L	+ 4 (+ 8 dB)
H	H	L	L	+ 3 (+ 6 dB)
L	H	L	L	+ 2 (+ 4 dB)
H	L	L	L	+ 1 (+ 2 dB)
L	L	L	L	0 (0 dB)
H	H	H	H	− 1 (− 2 dB)
L	H	H	H	− 2 (− 4 dB)
H	L	H	H	− 3 (− 6 dB)
L	L	H	H	− 4 (− 8 dB)
H	H	L	H	− 5 (−10dB)
L	H	L	H	− 6 (−12dB)

○ **Code Bits (9th to 12th bits)**

These code bits are assigned to TC9187N. TC9187N only accepts data through these code bits.

9	10	11	12
H	H	L	H

(2) The CK line is for the clock signal.

(3) The ST line is for the strobe signal. When this line goes "High" the volume data is latched.

The level of the frequency component of each audio signal is controlled by IC651. The output from pin 15 of IC652 is fed to pin 11 of IC651. The E2 signal is input to pin 12 of IC651.

When the deck or AUX is ON, the analog switch AS1 and AS3 are also ON, and the audio signal from the graphic equalizer is output to pin 13 and −14.

FF1 and FF2 are inverted by the leading edge of the pulse output from pin 15 and −16.

● Location of Major Parts

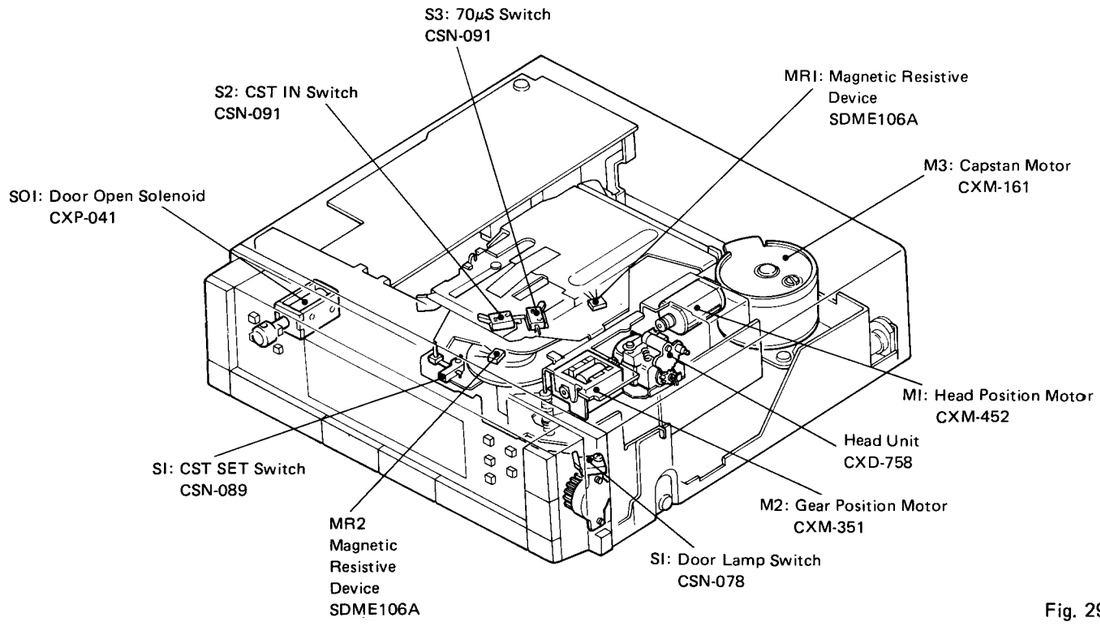


Fig. 29

• Operation

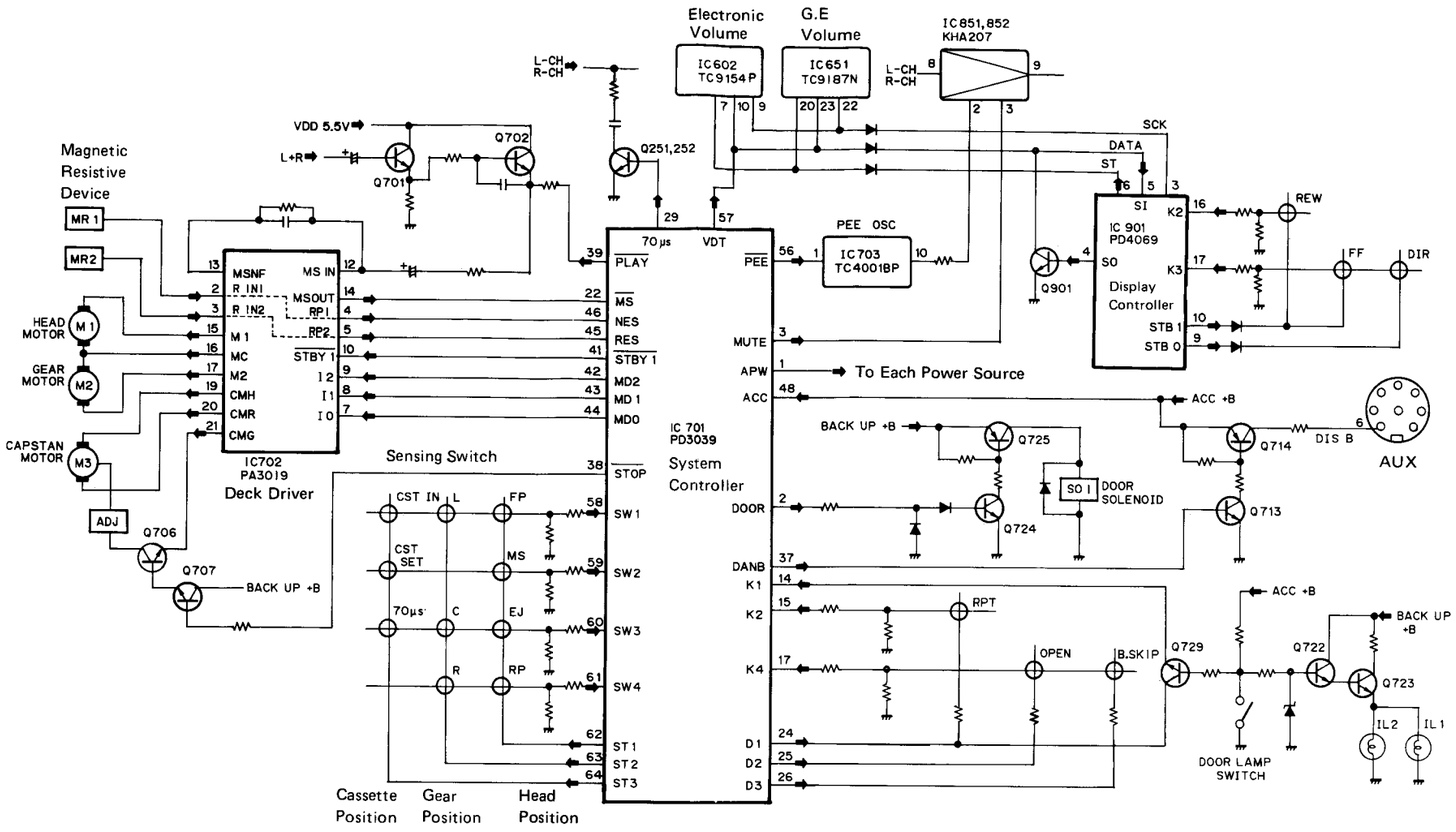


Fig. 30

○ Sensing switches

Cassette Position

Switch	Function
CST IN switch	Turned OFF when a cassette tape is inserted.
CST SET switch	Turned ON when the cassette tape is set in position.
70µs switch	Turned OFF when a 70µs cassette tape is inserted.

Head Position (Switch Position) . . . . Sense P.C. Board (A)

Position	Mechanism operation
FP	FWD PLAY
MS	MS
EJ	Eject
RP	REV PLAY

FF/REW Gear Position (Switch Position) . . . . Sense P.C. Board (B)

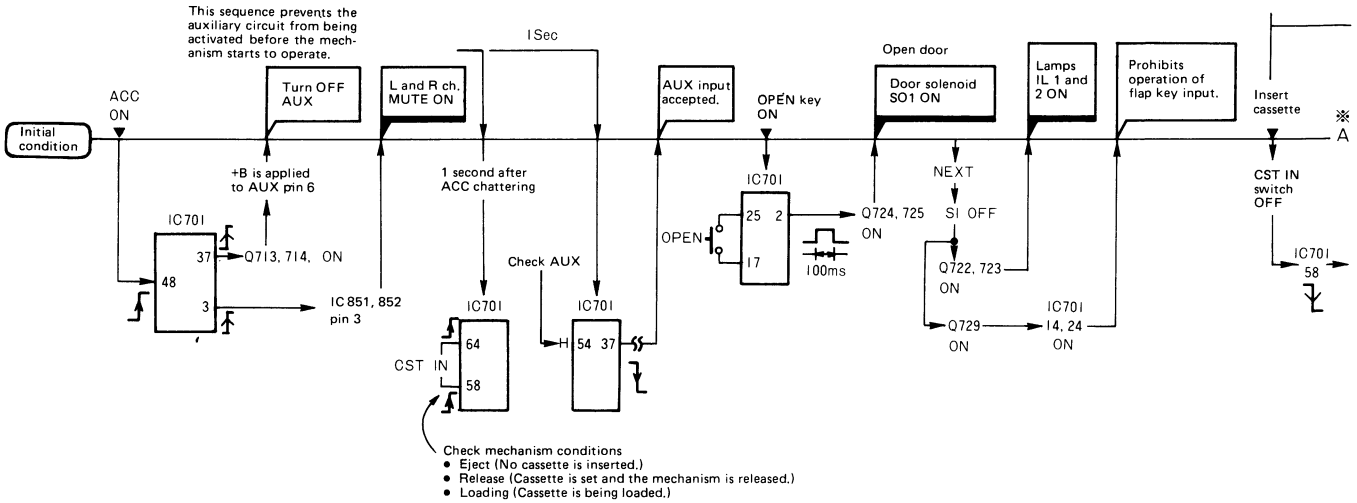
Position	Mechanism operation
L	FF in FWD (normal) and REW in REV
C	Eject or play
R	REW in FWD (normal) and FF in REV

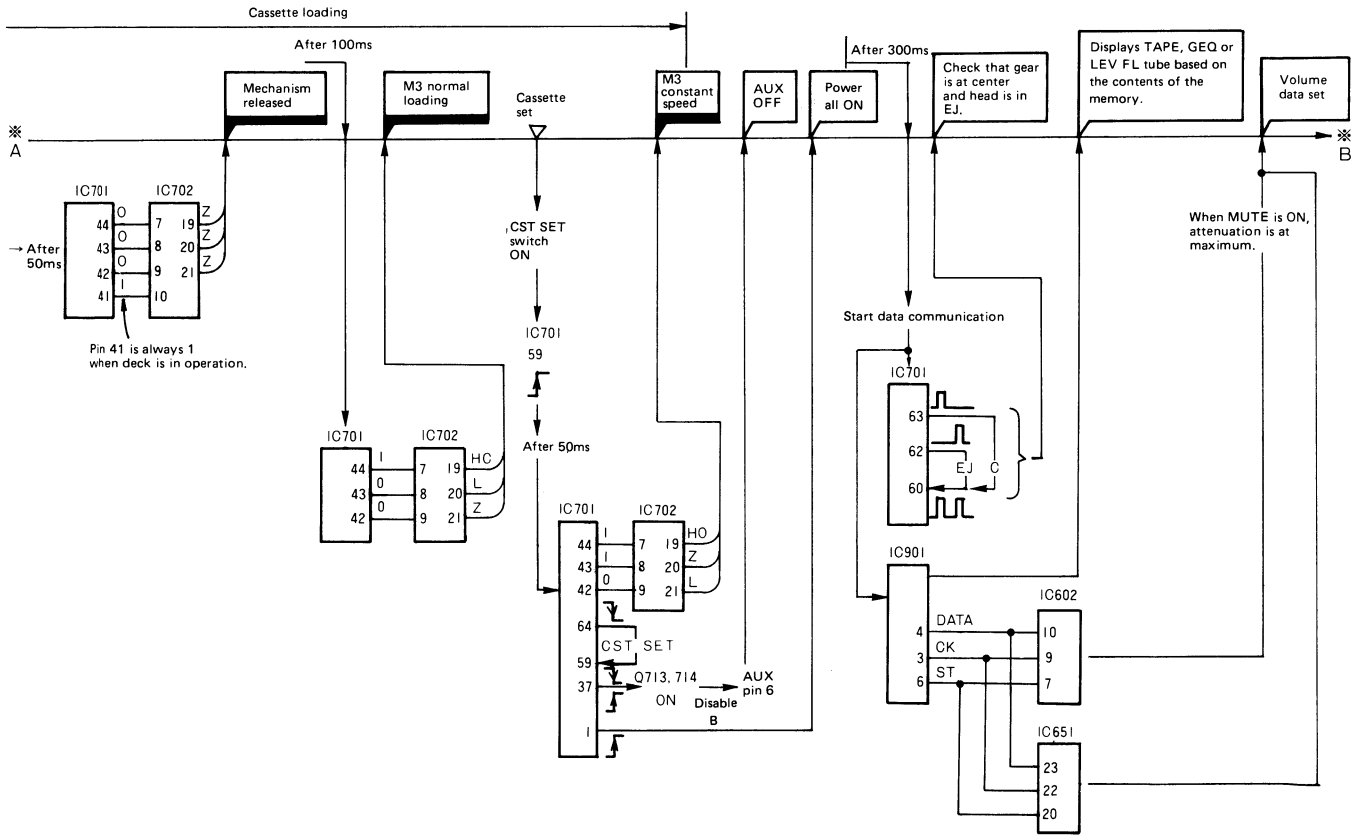
• Control Mode and Operation of Mechanism

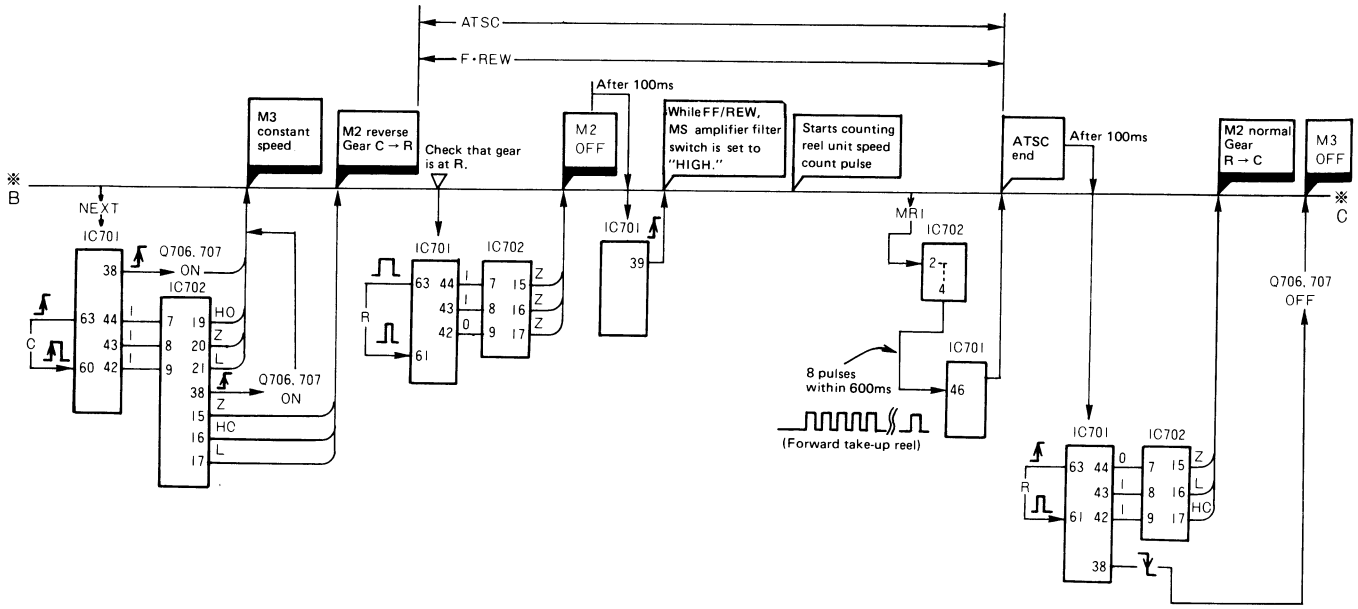
Control mode		Control code IC 701 (PD3039) MD 0 (44)	MD 1 (43)	MD 2 (42)	Mechanism operation	Output terminal voltage IC 702 (PA3019) CMH (19)	CMR (20)	CMG (21)	M 1 (15)	MC (16)	M 2 (17)
Output OFF		0	0	0	Release	Z	Z	Z	Z	Z	Z
M 3 (CM)	Normal	1	0	0	Loading	HC	L	↑	↑	↑	↑
	Reverse	0	1	0	Eject	L	HC	↑	↑	↑	↑
	Constant speed	1	1	0	PLAY, FF, REW or MS	HO	Z	L	↑	↑	↑
M1	Normal	0	0	1	Head EJ → FP	↑	↑	↑	HC	L	↑
	Reverse	1	0	1	Head EJ → RP	↑	↑	↑	L	HC	↑
M2	Normal	0	1	1	Gear direction: R → L	↑	↑	↑	Z	L	HC
	Reverse	1	1	1	Gear direction: L → R	↑	↑	↑	↑	HC	L

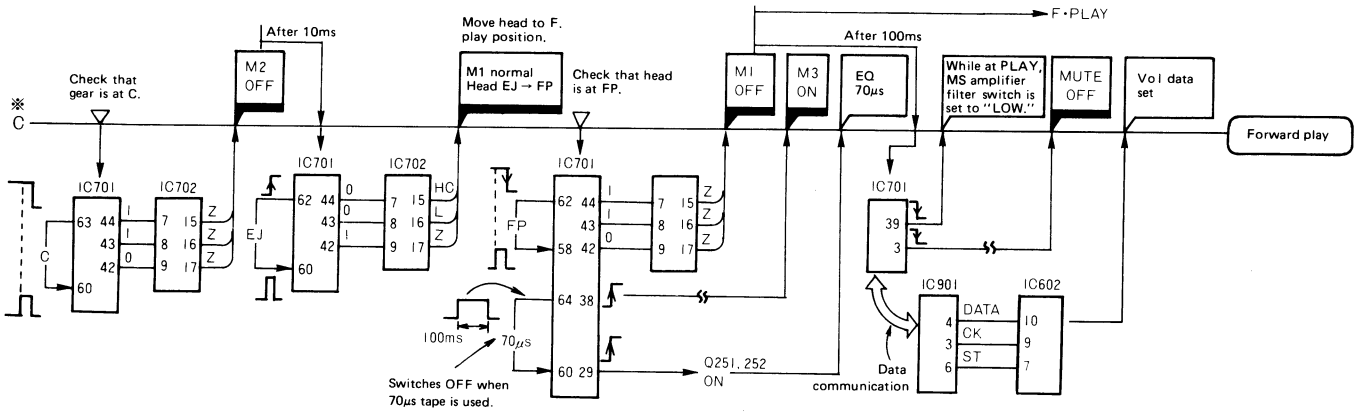
Notes: 1) Numbers in parentheses indicate pin numbers of each IC.
2) Output terminal voltage Z: High impedance
HC: Approximately 7V
HO: Vcc – 1.7V
L: 0V

1. Door Open → Cassette Insert → Forward Play

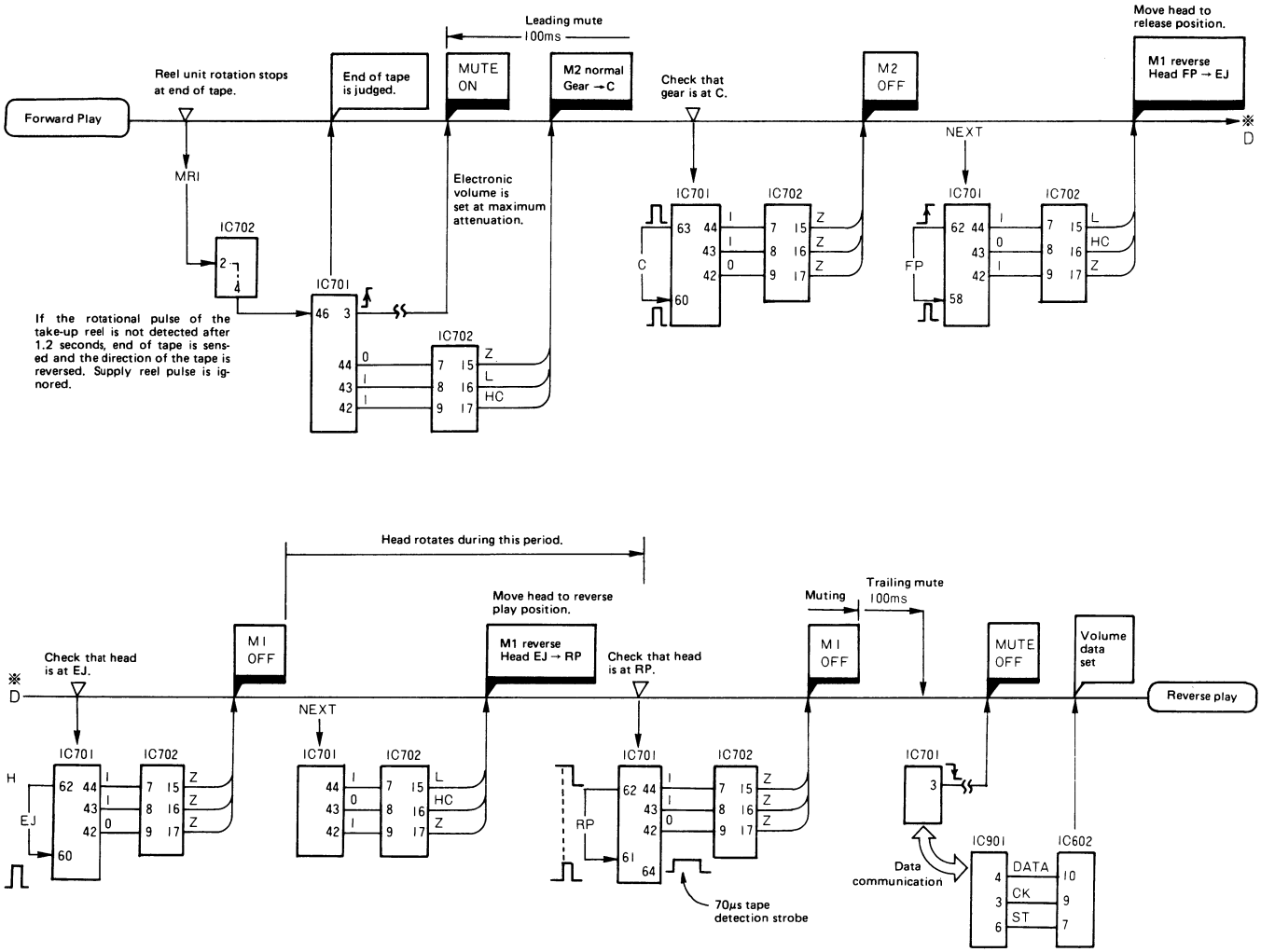




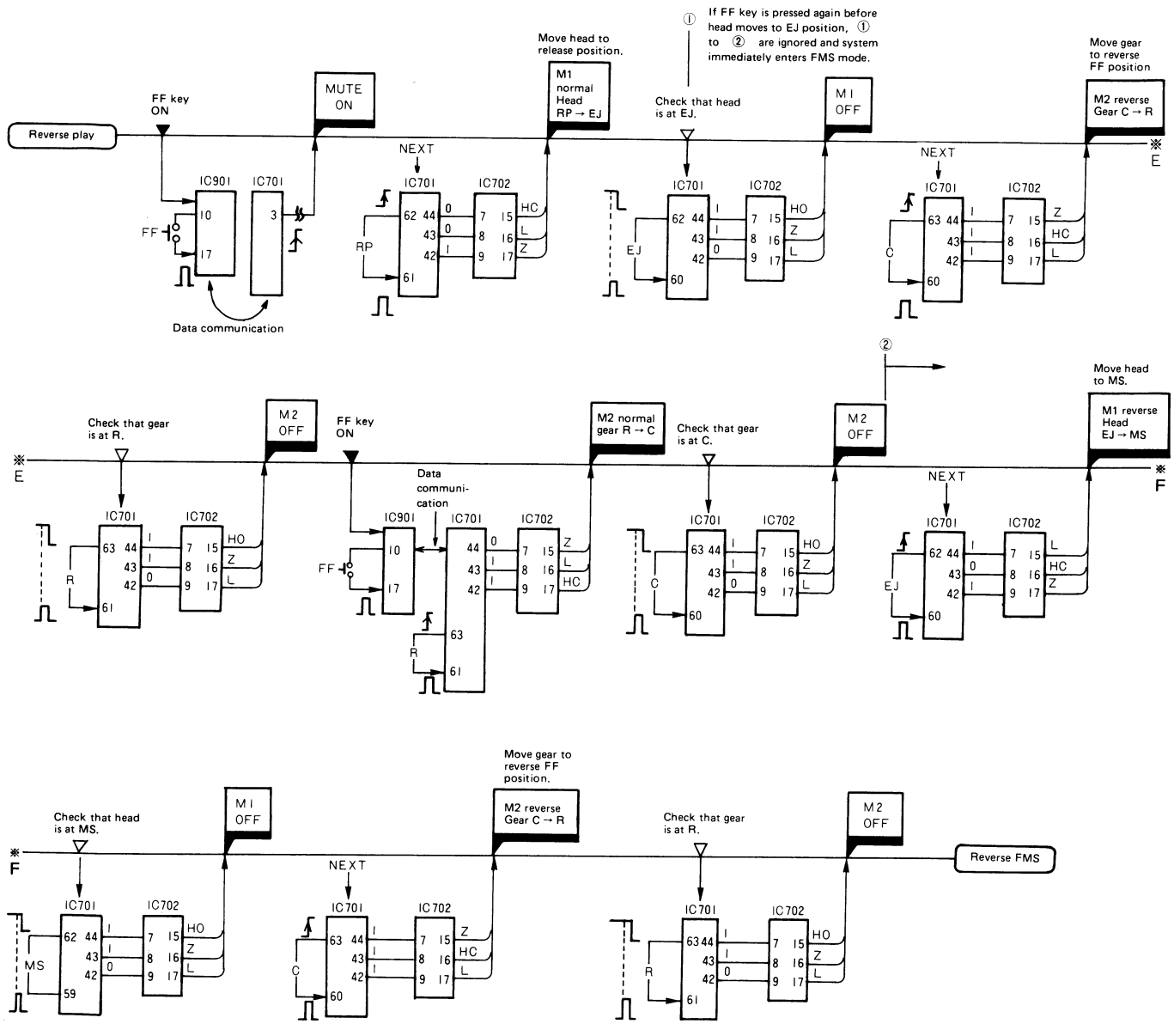

ATSC
F·REW
After 100ms
M3 constant speed
M2 reverse Gear C → R
Check that gear is at R.
M2 OFF
While FF/REW, MS amplifier filter switch is set to "HIGH."
Starts counting reel unit speed count pulse
ATSC end
After 100ms
M2 normal Gear R → C
M3 OFF
※B
※C
NEXT
IC701
IC702
Q706, 707 ON
Q706, 707 ON
MRI
8 pulses within 600ms
(Forward take-up reel)
Q706, 707 OFF


F·PLAY
After 10ms
Move head to F. play position.
Check that gear is at C.
M2 OFF
M1 normal Head EJ → FP
Check that head is at FP.
M1 OFF
M3 ON
EQ 70μs
After 100ms
While at PLAY, MS amplifier filter switch is set to "LOW."
MUTE OFF
Vol data set
Forward play
※C
IC701
IC702
IC901
IC602
100ms
70μs
Switches OFF when 70μs tape is used.
Q251, 252 ON
Data communication
DATA
CK
ST

2. Forward Play → Reverse Play

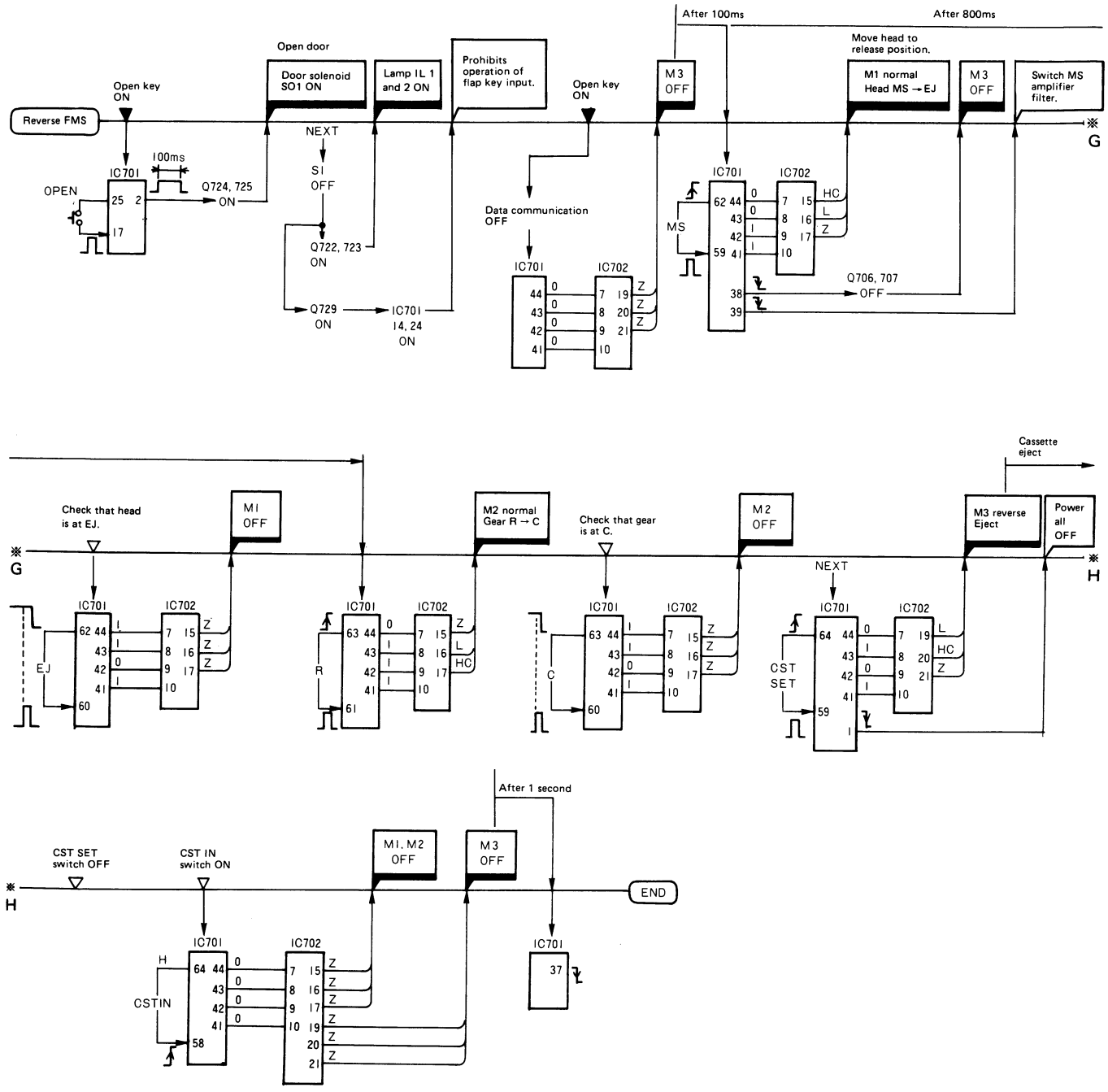


3. Reverse Play → Reverse FF (FF Key ON) → Reverse FMS (FF Key ON)



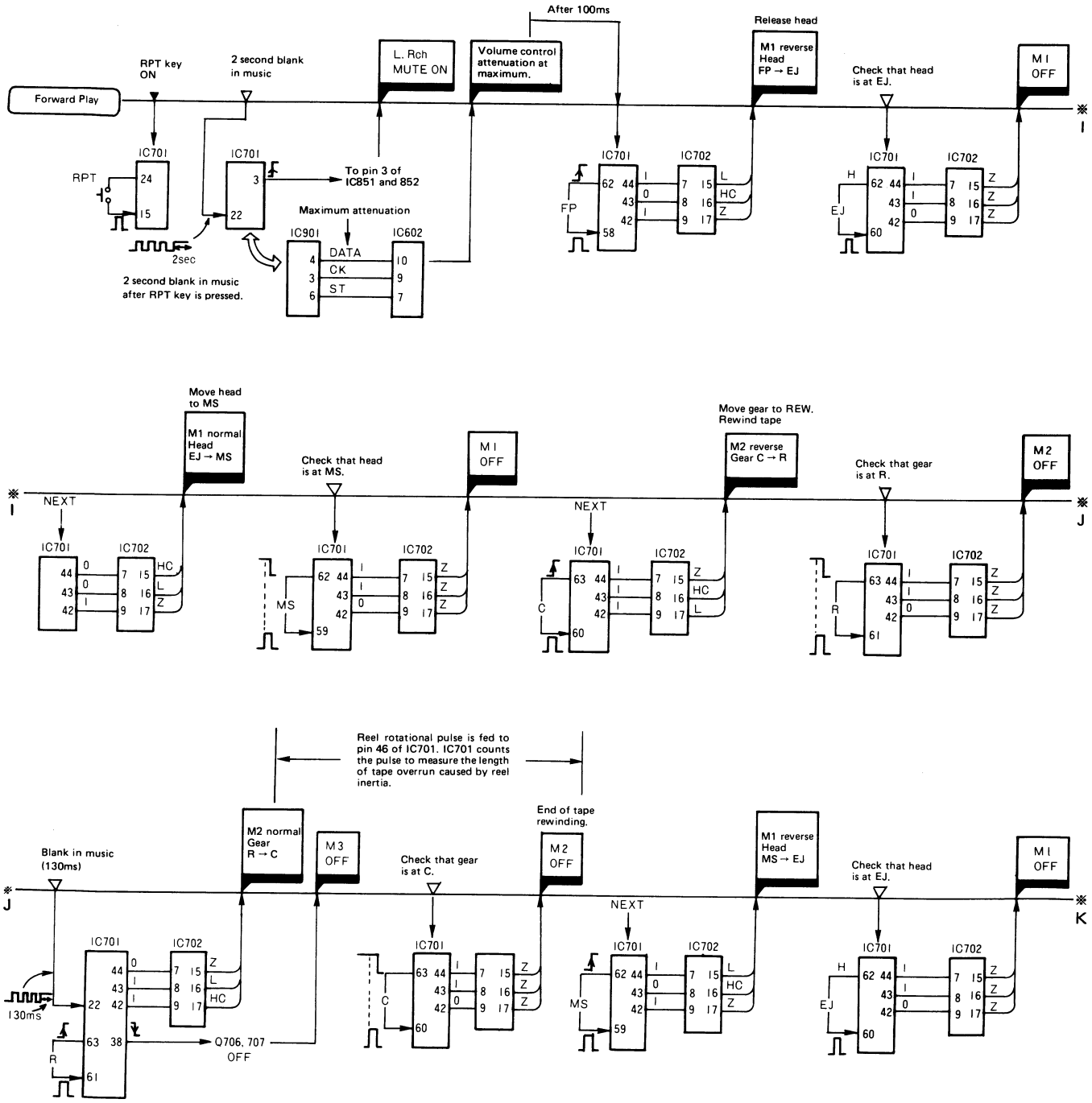
OPEN KEY ON

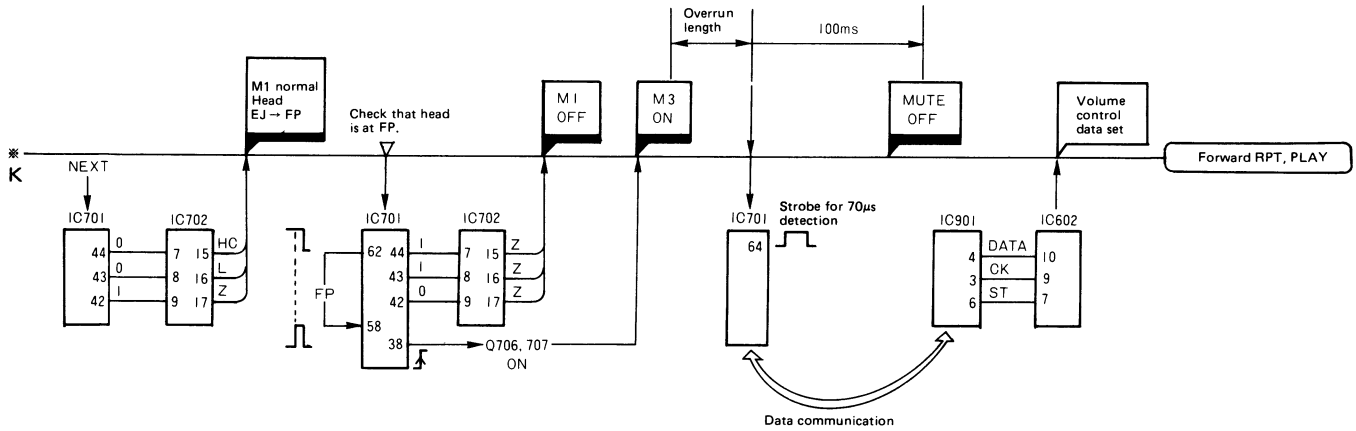
4. Reverse FMS → Release → Eject



RPT Key ON

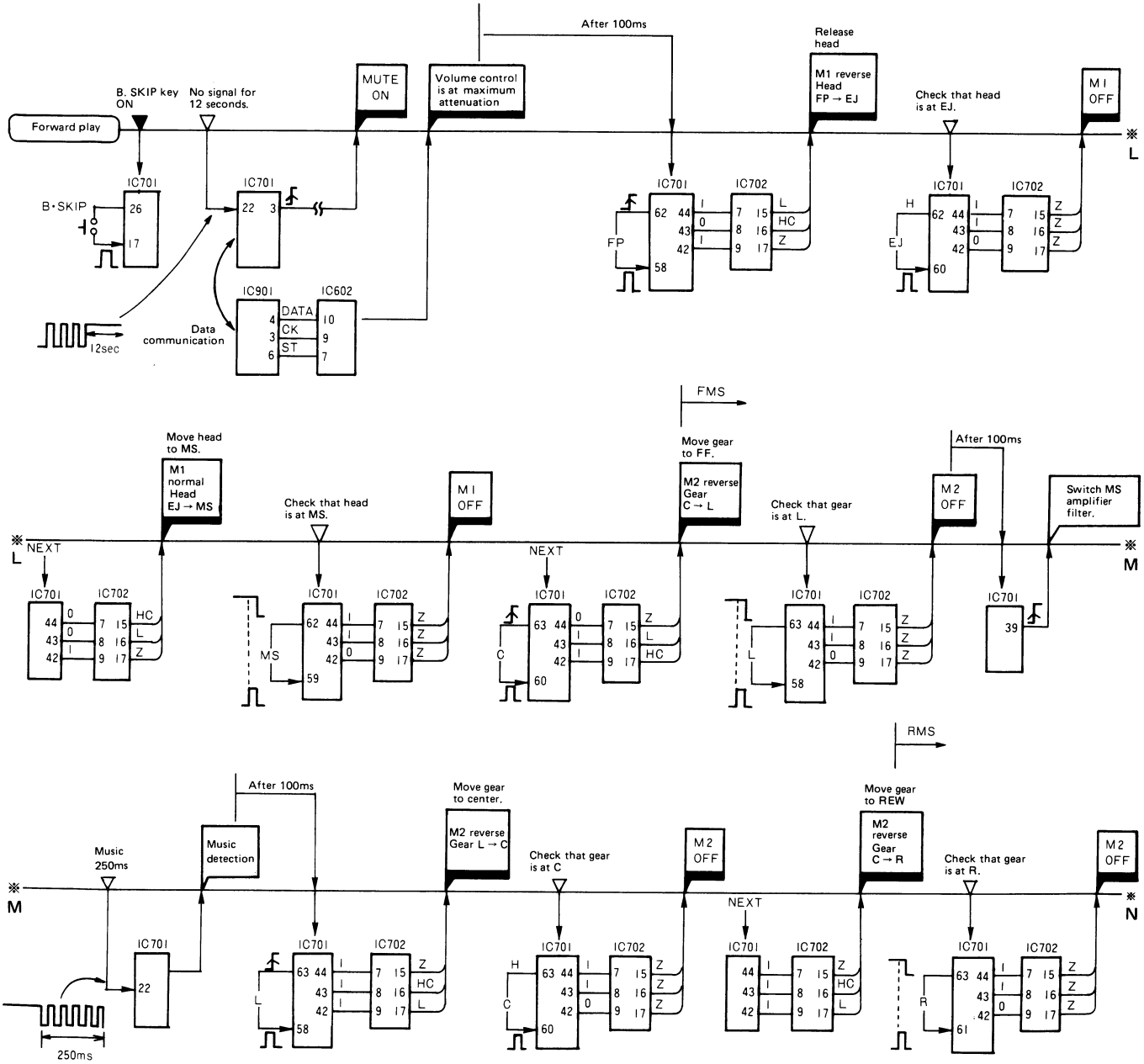
5. Forward Play → Forward RPT Play → Forward RPT REW → Forward RPT Play

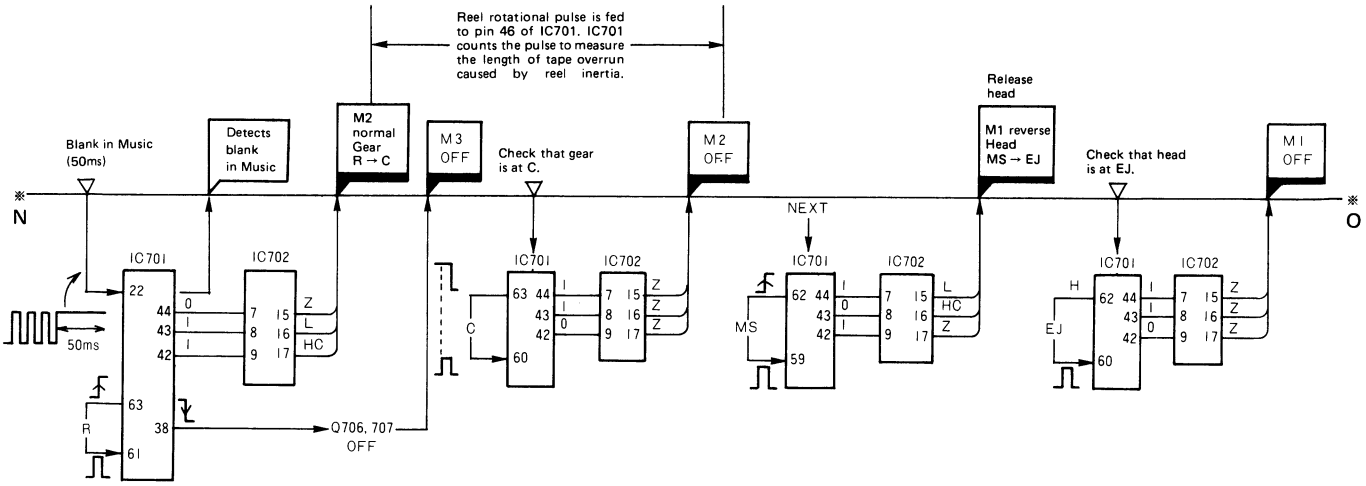


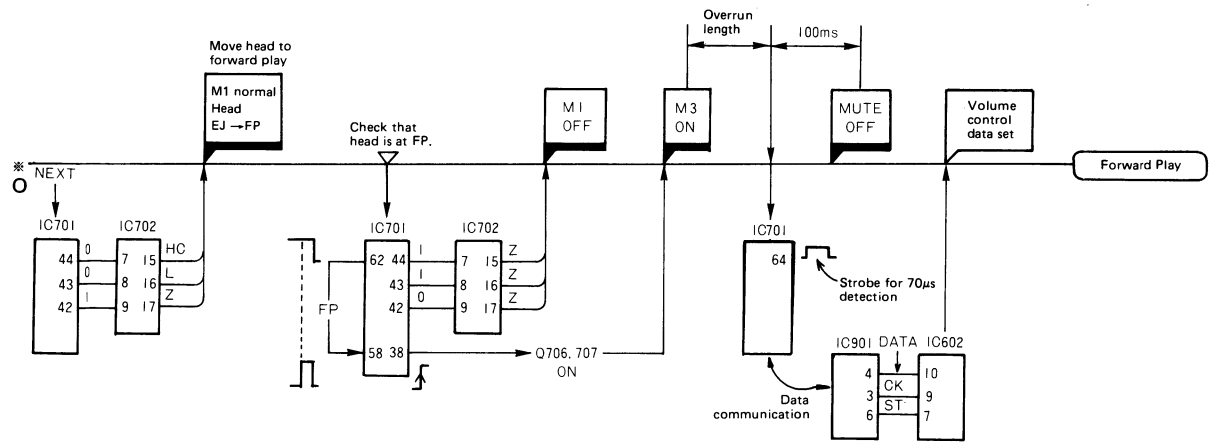

Overrun length
100ms
M1 normal Head EJ → FP
Check that head is at FP.
M1 OFF
M3 ON
MUTE OFF
Volume control data set
Forward RPT, PLAY
※K
NEXT
IC701
IC702
HC
L
Z
FP
Q706, 707 ON
Strobe for 70μs detection
IC901
IC602
DATA
CK
ST
Data communication

B . SKIP Key ON ↓ **No signal for 12 sec.** ↓

6. Forward Play → BS Forward Play → Forward 1 MS → Forward Play




Reel rotational pulse is fed to pin 46 of IC701. IC701 counts the pulse to measure the length of tape overrun caused by reel inertia.
Blank in Music (50ms)
Detects blank in Music
M2 normal Gear R → C
M3 OFF
Check that gear is at C.
M2 OFF
Release head
M1 reverse Head MS → EJ
Check that head is at EJ.
M1 OFF
※ N
※ O
NEXT
IC701
IC702
50ms
R
C
MS
EJ
H
Q706, 707 OFF


Overrun length
100ms
Move head to forward play
M1 normal Head EJ → FP
Check that head is at FP.
M1 OFF
M3 ON
MUTE OFF
Volume control data set
Forward Play
※ O
NEXT
IC701
IC702
FP
Q706, 707 ON
Strobe for 70μs detection
IC901
DATA
IC602
CK
ST
Data communication

• Protection Circuit

The error handling procedure of the protection circuit is described as follows:

1. If the CST SET switch is not turned ON within 5 seconds after the CST IN switch is turned OFF (when a cassette is inserted), the eject operation begins.
2. If the CST IN switch is not turned ON within 5 seconds after the eject operation begins, the cassette loading operation begins.
3. If the procedure described by 1 and 2 occurs consecutively for 3 times, the deck is stopped after the third try. If the eject key is pressed when the deck is stopped, the eject procedure is repeated.
4. If the ATSC action does not end within 12 seconds, a release function is initiated.
5. If the end of the tape is detected 4 times in 16 seconds, the release function is initiated.
6. If the head and gear are not placed in position within 4 seconds after the mechanism has started, the head motor (M1) and gear motor (M2) rotate in the opposite direction until the eject position is detected.
7. If M1 and M2 go beyond the target switch position and reach the switch of current tape direction (FP, RP, L, R), M1 and M2 rotate in the opposite direction until the eject position is detected.
8. If the procedure described above in 6 and 7 occurrs 2 times consecutively, the deck is stopped.
9. If the deck function is terminated due to the reasons described above, only TAPE and EJECT keys remain active.
10. If a communication is interrupted for approximately 1 second after the deck begins to operate or AUX has been selected, the system is turned OFF. The communication is then reset and a stand-by signal is sent to the display controller. If there is a reply from the display controller, the system is turned ON again and normal operation is reinitiated. If there is no reply, the system returns to the communication error mode and the whole process is repeated.
11. If the stand-by instruction is sent to the display controller when the TAPE or AUX is OFF and there is no reply from the display controller, the communication reset and stand-by instructions are repeated (described in 10). If there is a reply from the display controller the system is turned OFF.

9. ADJUSTMENT

9.1 DOLBY NR LEVEL ADJUSTMENT

- **Connection Diagram**

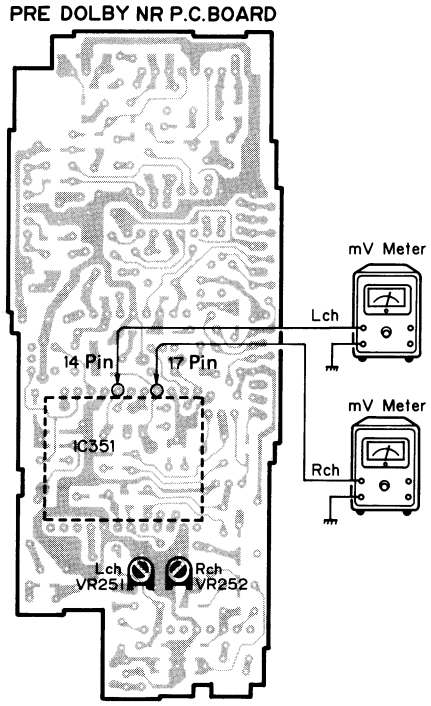


Fig. 31

- **To Adjust**

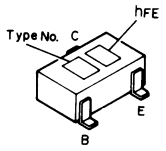
1. Set Dolby NR switch in "off" position.
2. Reproduce CT-150 (400Hz, 200nwb/m). Adjust VR 251 (left channel) and VR 252 (right channel) so that the mV meters show 300 mV. Adjustment accuracy should be ±1dB. (300mV= −8.24dBs)

• ICs and Transistors

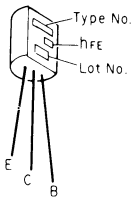
CHIP TRANSISTORS

Part No.	Indication
2SC2712-LG	LG
2SC2712-LY	LY
2SD601-YQ	YQ
2SD601-YR	YR

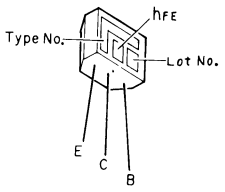
2SC2712
2SD601



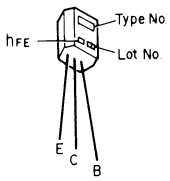
2SB647A



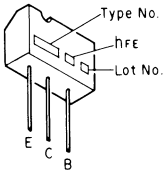
2SA933S



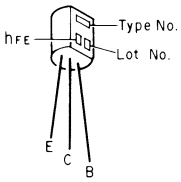
2SA1048
2SC1740S
2SC2458



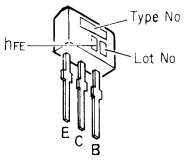
2SD1055F



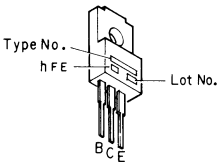
2SA934
2SC2060



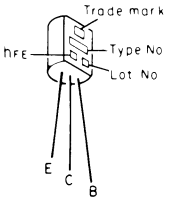
2SD1227M



2SB945

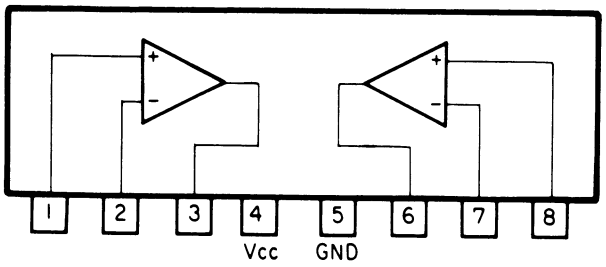


2SC2634NC

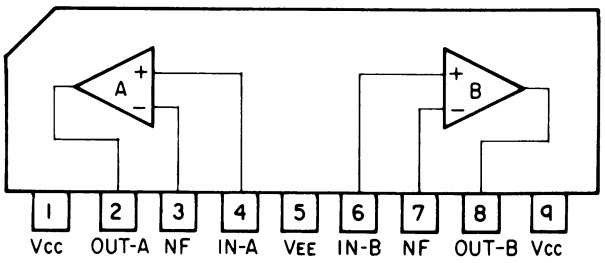


AUDIO CONTROL UNIT

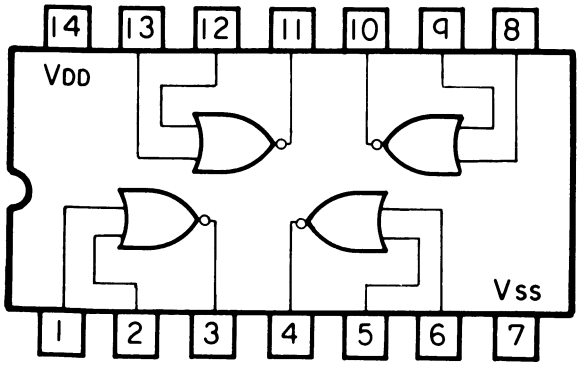
IC251 : MB3106M



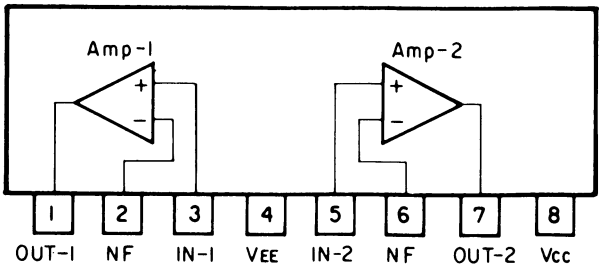
IC601,603,710 : TA75558S



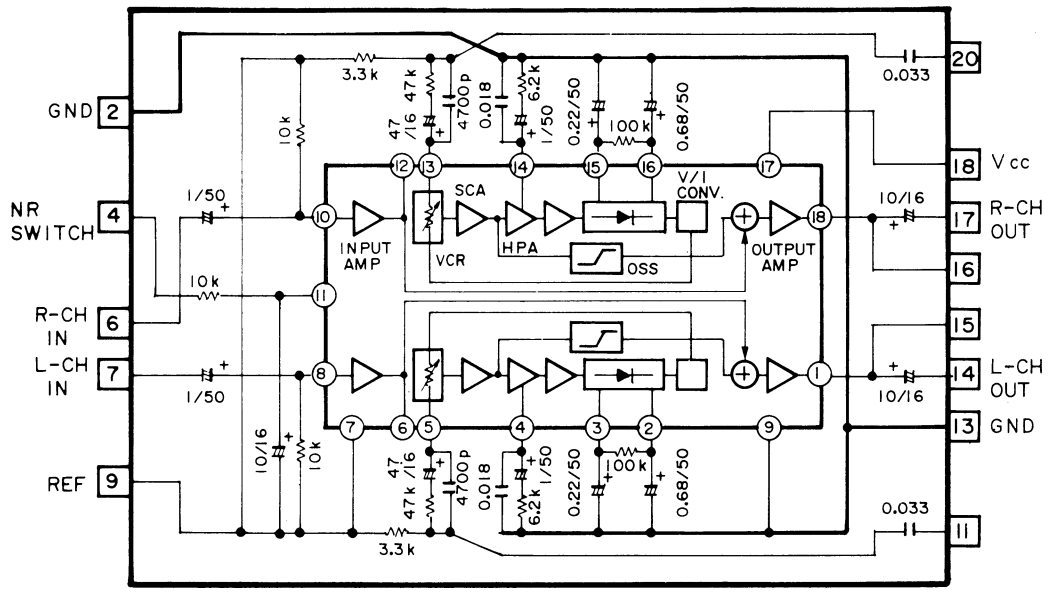
IC703 : TC4001BP



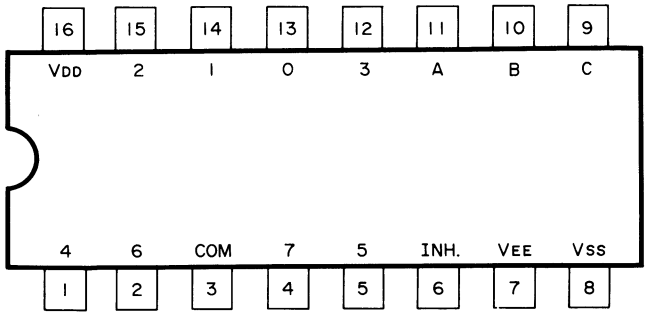
IC604 : M5220L

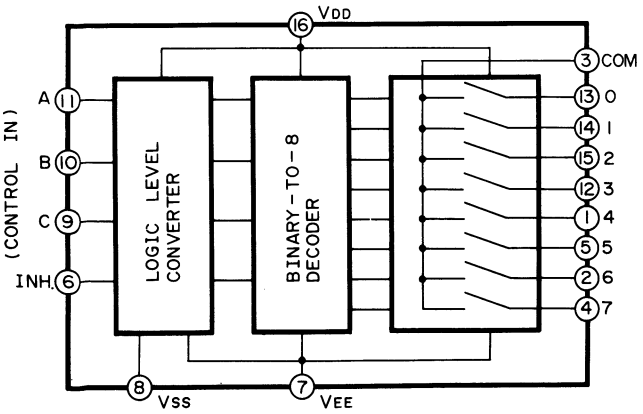


IC351 : NR9200



IC707 : TC4051BP





TC4051BP is an 8-channel multiplexer that can select and combine analog and digital signals.

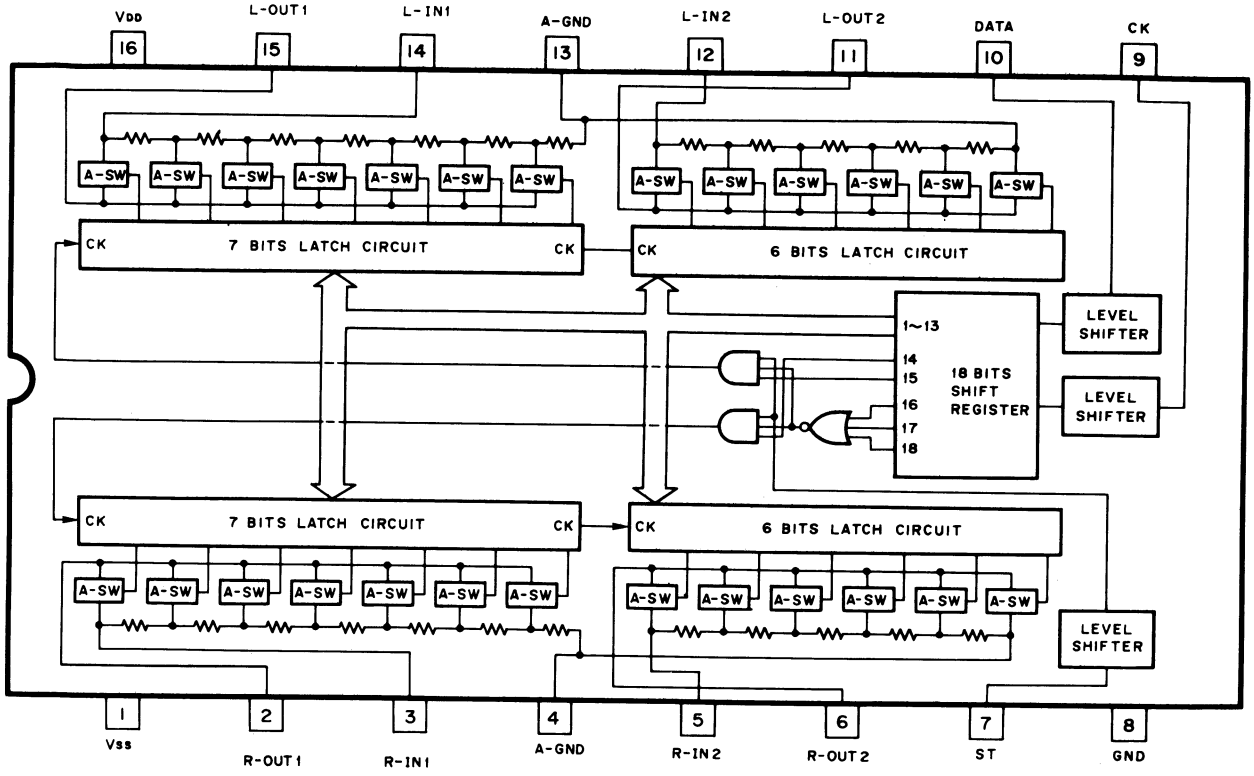
The digital signal fed to the control terminal turns the corresponding switch to ON.

Truth Table for TC4051BP

Control input				ON channel
INH.	C	B	A	
L	L	L	L	0
L	L	L	H	1
L	L	H	L	2
L	L	H	H	3
L	H	L	L	4
L	H	L	H	5
L	H	H	L	6
L	H	H	H	7

Even when the levels of the input signals A, B and C correspond to those of the table, if INH is HIGH, none of the channels will switch to ON.

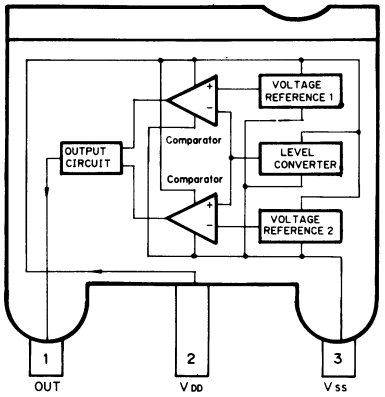
IC602 : TC9154P



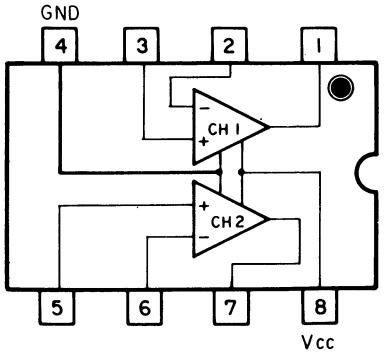
• Pin Function (TC9154P) (Electronic Volume)

Pin No.	Pin Name	I/O	Function and Operation
1	Vss	–	(–) power source pin
2	R-OUT1	Output	10 dB step attenuation output
15	L-OUT1	Output	Signal received at IN, reduced from 0 dB to –60 dB in 7 steps of 10dB
3	R-IN1	Input	10 dB step attenuation input
14	L-IN1	Input	
4	A-GND	–	AC ground
13	A-GND	–	AC ground
5	R-IN2	Input	2 dB step attenuation input
12	L-IN2	Input	
6	R-OUT2	Output	2 dB step attenuation output
11	L-OUT2	Output	Signal received at IN reduced from 0 dB to –8 dB in 5 steps of 2 dB
7	ST	Input	Strobe input pin – attenuation & channel selection signals received from the DATA and CK terminals are latched by going "H" level at this pin – if "H" level not reached at this pin, prior data is used.
8	GND	–	
9	CK	Input	Input pin for clock used when receiving data from the DATA pin
10	DATA	Input	Attenuation and channel selection data input pin – inputted as 18 bit CK signal.
16	VDD	–	(+) power source pin

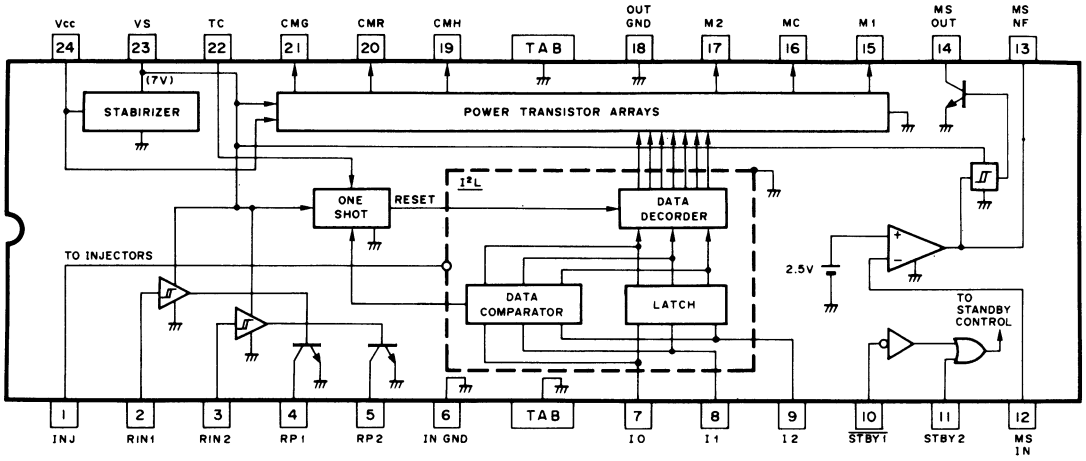
IC708 : MN1280



IC709 : HA17358



IC702 : PA3019



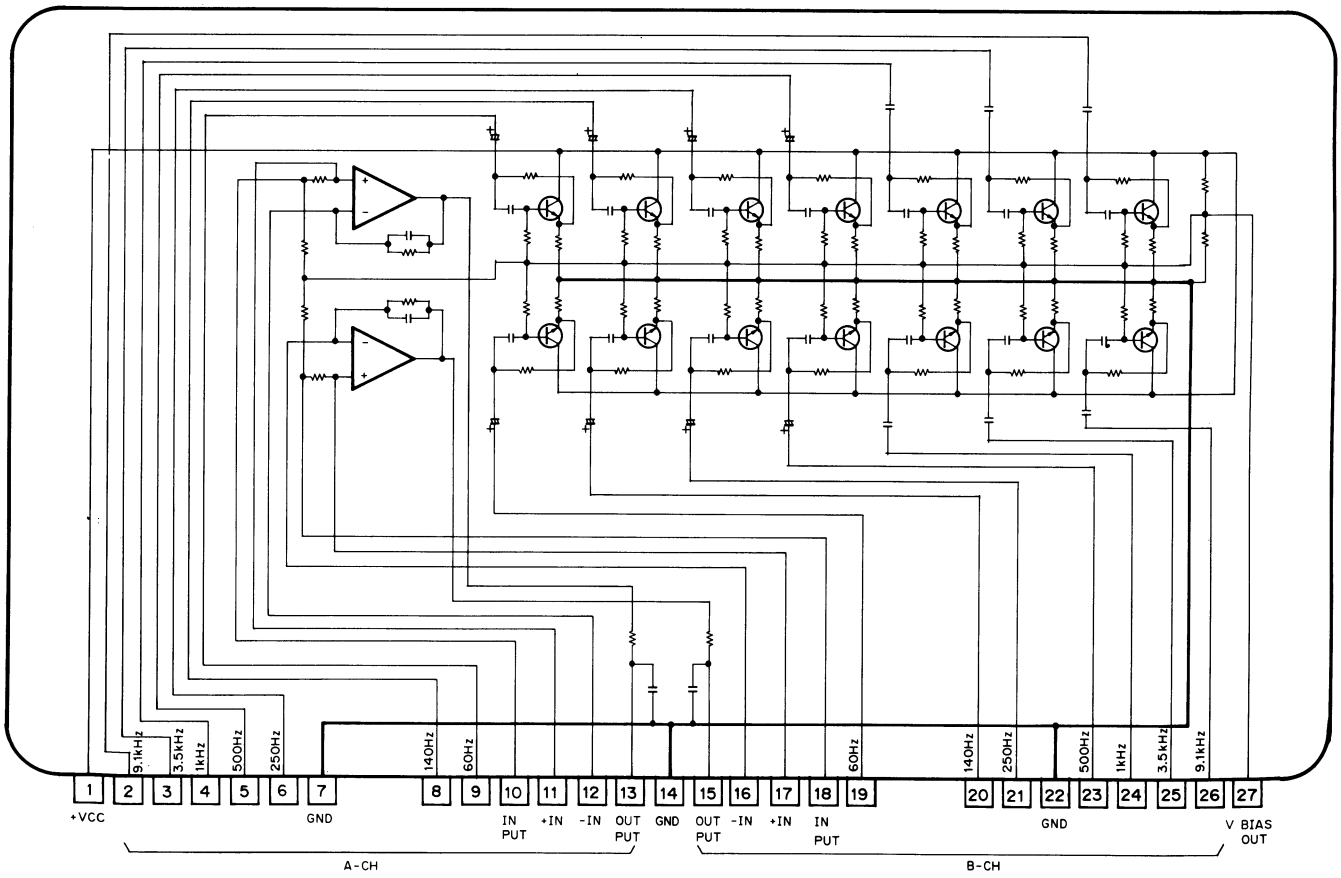
• Pin Function (PA 3019) (Deck Driver)

Pin No.	Pin Name	I/O	Function and Operation
1	INJ	Input	"Internal logic" (I^2L) power source
2	RIN1	Input	Input pin for reel unit rotation sensor (MR 1)
3	RIN2	Input	Input pin for reel unit rotation sensor (MR 2)
4	RP1	Output	Output for wave form signal from reel sensor input 1 (pin 2)
5	RP2	Output	Output for wave form signal from reel sensor input 2 (pin 3)
6	IN GND	—	Low signal system ground pin
7	I0	Input	Motor control logic input pin
8	I1	Input	
9	I2	Input	
10	$\overline{\text{STBY1}}$	Input	Standby control — switches IC power circuit off at active low (0.7V or less).
11	STBY2	Input	Standby control — switches IC power circuit off at active high (3.5V or more).
12	MSIN	Input	Input (inverted) pin for MS amp.
13	MSNF	Output/ Input	MS amp. output and MS Schmitt circuit input
14	MSOUT	Output	MS Schmitt circuit output — when signal level at MSNF pin exceeds 0 dBm, pulse is outputted open when below 0 dBm

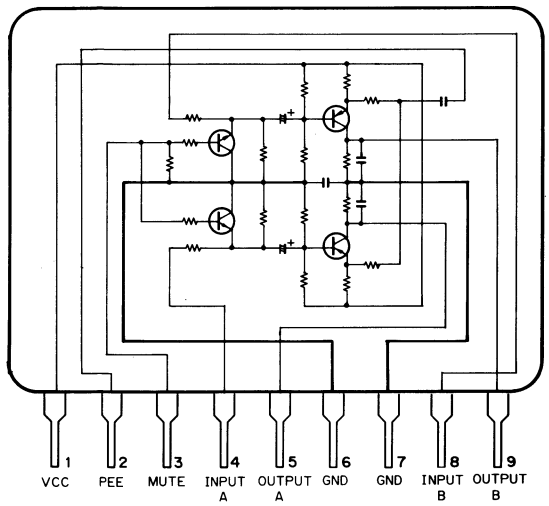
Pin No.	Pin Name	I/O	Function and Operation
15	M1	Output	Drive output "+" pin for head drive motor M1
16	MC	Output	Drive output common pin for motors M1 and M2
17	M2	Output	Drive output "+" pin for drive motor M2 ("FF/REW" switching gear)
18	OUT GND	—	Motor drive circuit ground pin
19	CMH	Output	Drive output H (+) pin for capstan motor M3 output voltage: During speed control: app. Vcc−1.7V During loading and eject: 6.9V
20	CMR	Output	Drive output R pin for capstan motor M3 During speed control: open During loading: app. 0V During eject: app. 7V
21	CMG	Output	Drive output GND (−) pin for capstan motor M3 During speed control: app. 0V During loading and eject: open
22	TC	Output	Pin for capacitor for setting timer to switch power transistor off in a set time when logic inputs I0, I1, I2 change.
23	VS	Output	Power source for reel rotation sensor — app. 7V
24	Vcc	Input	IC power supply pin

G.E. UNIT

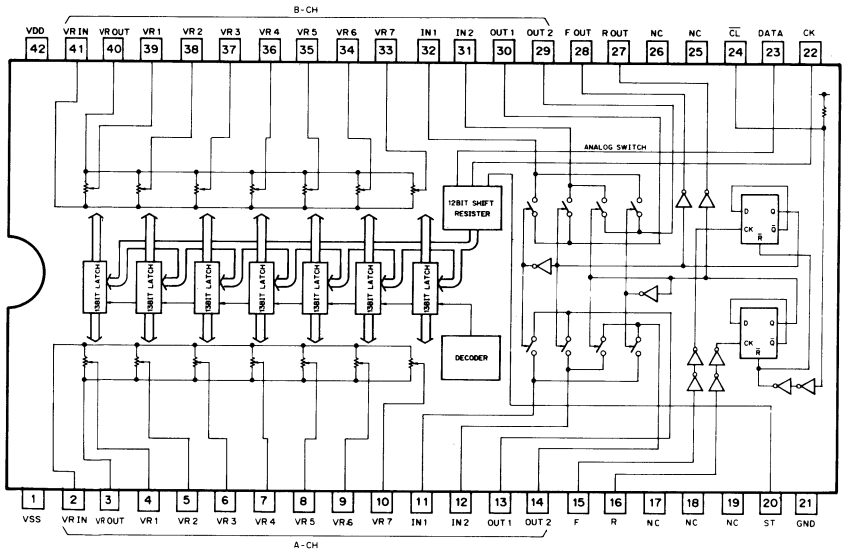
IC652 : KHA206



IC851,852 : KHA207



IC651 : TC9187N



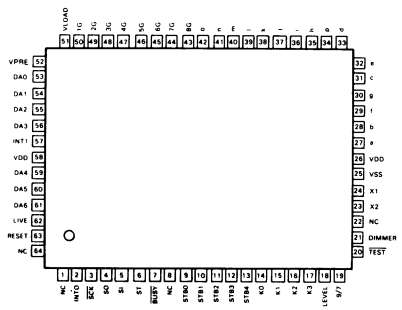
• Pin Function (TC9187N) (Electronic Volume Control for Graphic Equalizer)

Pin No.	Pin name	I/O	Function and Operation	Pin No.	Pin name	I/O	Function and Operation
1	VSS		GND	8	VR5		Common for volume 5. R-ch 250Hz
2	VR IN	Input	Common input pin for volume controls (R-ch)	9	VR6		Common for volume 6. R-ch 140Hz
3	VR OUT	Output	Common output pin for volume controls (R-ch)	10	VR7		Common for volume 7. R-ch 60Hz
4	VR1		Common for volume 1. R-ch 9.1kHz	11	IN1	Input	Input pin for signal that has passed through graphic equalizer (L-ch).
5	VR2		Common for volume 2. R-ch 3.5kHz	12	IN2	Input	Input pin for signal that has not passed through graphic equalizer (L-ch)
6	VR3		Common for volume 3. R-ch 1kHz	13	OUT1	Output	Output of analog switch matrix (Front L-ch)
7	VR4		Common for volume 4. R-ch 500Hz	14	OUT2	Output	Output of analog siwtch matrix (Rear L-ch)

Pin No.	Pin name	I/O	Function and Operation	Pin No.	Pin name	I/O	Function and Operation
15	F	Input	Front graphic equalizer ON/OFF control input	28	F OUT		Not used
16	R	Input	Rear graphic equalizer ON/OFF control input	29	OUT 2	Output	Output of analog switch matrix (Rear R-ch)
17 – 19	NC		Not used	30	OUT 1	Output	Output of analog switch matrix (Front R-ch)
20	ST	Input	Strobe input: When this pin goes to "HIGH," the control data input to DATA and CK pins is latched.	31	IN 2	Input	Input pin for signal that has not passed through graphic equalizer (R-ch)
				32	IN 1	Input	Input pin for signal that has passed through graphic equalizer (R-ch).
				33	VR 7		Common for volume 7. L-ch 60Hz
21	GND			34	VR 6		Common for volume 6. L-ch 140Hz
22	CK	Input	Input pin for clock used to acquire control data	35	VR 5		Common for volume 5. L-ch 250Hz
23	DATA	Input	Input pin for 12-bit control data.	36	VR 4		Common for volume 4. L-ch 500Hz
24	$\overline{CL}$	Input	Input pin for control signal that initializes analog switch matrix. In the initial state, pin 11, –13 and –14, and pin 32, –29 and –30 are directly connected.	37	VR 3		Common for volume 3. L-ch 1kHz
				38	VR 2		Common for volume 2. L-ch 3.5kHz
				39	VR 1		Common for volume 1. L-ch 9.1kHz
				40	VR OUT	Output	Common output pin for volume controls (L-ch).
25, 26	NC		Not used	41	VR IN	Input	Common input pin for volume controls (L-ch).
27	R OUT		Not used	42	VDD		

DISPLAY UNIT

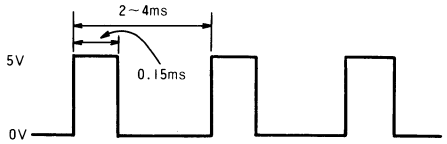
*IC901 : PD4069



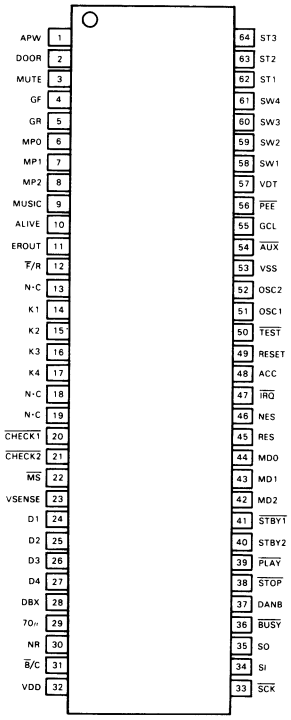
*IC's maker by *are MOS type.*
Be careful in handling them because they are very liable to be damaged by electrostatic induction.

• Pin Function (PD4069) (Display Controller)

Pin No.	Pin name	I/O	Function and Operation
1	NC		Not used
2	INTO	Input	Interrup input (GND)
3	$\overline{SCK}$	Input/Output	Input pin for the clock used for 8-bit serial data communication.
4	SO	Output	8-bit serial data output (CMOS output)
5	SI	Input	8-bit serial data input terminal (MOS gate input)
6	ST	Output	Output of control data latch signal for electronic volume control IC602 (TC9154P) and graphic equalizer electronic volume control IC651 (TC9187N) (CMOS output).
7	$\overline{BUSY}$	Input/Output	Input/output pin for 8-bit serial data control signal: When data cannot be received, "LOW" is output. This pin is usually of high impedance.
8	NC		Not used

<table>
<tr><th>Pin No.</th><th>Pin name</th><th>I/O</th><th>Function and Operation</th></tr>
<tr><td>9</td><td>STB0</td><td>Output</td><td rowspan="5">Output pin for key scanning strobe signal (CMOS output)
 
</td></tr>
<tr><td>10</td><td>STB1</td><td>Output</td></tr>
<tr><td>11</td><td>STB2</td><td>Output</td></tr>
<tr><td>12</td><td>STB3</td><td>Output</td></tr>
<tr><td>13</td><td>STB4</td><td>Output</td></tr>
<tr><td>14</td><td>K0</td><td>Input</td><td rowspan="4">Input pin for key scanning return signal (MOS gate input):
The key pressed is determined by the following table:
<table>
<tr><th></th><th>STB0</th><th>STB1</th><th>STB2</th><th>STB3</th><th>STB4</th></tr>
<tr><td>K0</td><td></td><td>VR+</td><td></td><td>LEV.+</td><td>FREQ+</td></tr>
<tr><td>K1</td><td>ATT</td><td>VR–</td><td>DOL.B</td><td>LEV.–</td><td>FREQ–</td></tr>
<tr><td>K2</td><td></td><td>REW</td><td></td><td>PRE CUR</td><td>PRE1</td></tr>
<tr><td>K3</td><td>DIR/REL</td><td>FF</td><td></td><td>MEMO</td><td>PRE2</td></tr>
</table></td></tr>
<tr><td>15</td><td>K1</td><td>Input</td></tr>
<tr><td>16</td><td>K2</td><td>Input</td></tr>
<tr><td>17</td><td>K3</td><td>Input</td></tr>
<tr><td>18</td><td>LEVEL</td><td>Input</td><td>Input pin for the output of the comparator that converts the analog audio signal to digital signal (MOS gate input).</td></tr>
<tr><td>19</td><td>9/$\overline{7}$</td><td>Input</td><td>Input pin for signal that selects KPX-999 or KPX-777 system (MOS gate input).</td></tr>
<tr><td>20</td><td>$\overline{\text{TEST}}$</td><td>Input</td><td>Input pin for IC test program start signal. (Used for checking the characteristic of PD4069)</td></tr>
<tr><td>21</td><td>DIMMER</td><td>Input</td><td>Dimmer control input (MOS gate input):
The FL tube brightness is controlled by varying the dynamic driving duty.
"HIGH" . . . . . Duty is approx. 1/21 (Dimmer ON)
"LOW" . . . . . Duty is approx. 1/8 (Dimmer OFF)</td></tr>
<tr><td>22</td><td>NC</td><td></td><td>GND</td></tr>
<tr><td>23</td><td>X2</td><td></td><td rowspan="2">The 4 MHz ceramic resonator of the clock oscillator is connected to these pins.</td></tr>
<tr><td>24</td><td>X1</td><td></td></tr>
<tr><td>25</td><td>Vss</td><td></td><td>GND</td></tr>
<tr><td>26</td><td>VDD</td><td></td><td>Power source</td></tr>
<tr><td>27</td><td>a</td><td>Output</td><td rowspan="9">FL anode output (P-channel open drain)</td></tr>
<tr><td>28</td><td>b</td><td>Output</td></tr>
<tr><td>29</td><td>f</td><td>Output</td></tr>
<tr><td>30</td><td>g</td><td>Output</td></tr>
<tr><td>31</td><td>c</td><td>Output</td></tr>
<tr><td>32</td><td>e</td><td>Output</td></tr>
<tr><td>33</td><td>d</td><td>Output</td></tr>
<tr><td>34</td><td>p</td><td>Output</td></tr>
<tr><td>35 – 42</td><td>h – o</td><td>Output</td></tr>
<tr><td>43 – 50</td><td>8G – 1G</td><td>Output</td><td>FL grid output (P-channel open drain)
Pulse width Dimmer ON: approx. 12μs
Dimmer OFF: approx. 30μs
Repetition period: approx. 250μs</td></tr>
<tr><td>51</td><td>VLOAD</td><td>Input</td><td>Power source for display driver (–27V)</td></tr>
<tr><td>52</td><td>VPRE</td><td>Input</td><td>Power source for display pre-driver connected to GND</td></tr>
<tr><td>53 – 56</td><td>DA0 – DA3</td><td>Output</td><td>Output pin for D/A converter (CMOS output)</td></tr>
<tr><td>57</td><td>INT1</td><td>Input</td><td>Connected to GND</td></tr>
<tr><td>58</td><td>VDD</td><td></td><td>Power source</td></tr>
<tr><td>59 – 61</td><td>DA4 – DA6</td><td>Output</td><td>Output pin for D/A converter (CMOS output)</td></tr>
<tr><td>62</td><td>LIVE</td><td>Output</td><td>Several ms-width pulses appear at this pin when PD4069 is in operation. Not used</td></tr>
<tr><td>63</td><td>RESET</td><td>Input</td><td>Hard reset input</td></tr>
<tr><td>64</td><td>NC</td><td>Output</td><td>Not used</td></tr>
</table>

AUDIO CONTROL UNIT
*IC701 : PD3039



• Pin Function (PD3039) (System Controller)

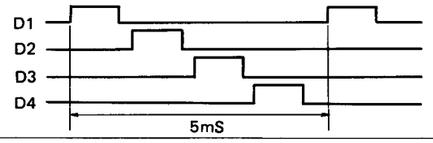
Pin No.	Pin name	I/O	Function and Operation
1	APW	Output	Output pin for the audio power source control signal: This pin becomes "HIGH" when ATSC is started and is kept "HIGH" while the deck is in operation. (P-channel open drain)
2	DOOR	Output	Output pin for door open solenoid control signal: If the door open key is pressed a 100ms gate pulse is output from this pin. • When the door is closed, the door open key is scanned only once every 1 second (approximately). (P-ch open drain)
3	MUTE	Output	Mute output: This pin is always "LOW" when ACC is OFF. When ACC is ON, the pin becomes "LOW" if the deck is in the play mode or AUX is selected. (If IRQ is ON or ACC is OFF, the pin goes "LOW" after mute output of approximately 1 second.) • When the ACC is activated, depending on the ACC input, "HIGH" or "LOW" is output from this pin. If DECK and AUX are OFF when ACC is ON, this pin goes "LOW" after mute output of approximately 1 second. (P-ch open drain)
4	GF	Output	Front graphic equalizer ON/OFF switching output (P-ch open drain): Approximately 20μs pulse is output from this pin, when F key is pressed.
5	GR	Output	Rear graphic equalizer ON/OFF switching output (P-ch open drain) Approximately 20μs pulse is output from this pin, when R key is pressed.
6	MP0	Output	Multiplexer IC707 (TC4051BP) control output (P-ch open drain) If DECK or AUX is selected, these pins always output control data shown in the following table:
7	MP1	Output	
8	MP2	Output	

MP2	MP1	MP0	Selected pin of IC707
0	1	0	15
1	0	0	1

Pin No.	Pin name	I/O	Function and Operation
9	MUSIC	Output	Condition of music Yes/No flag (inside PD3039) is output from this pin. (Not used) Yes . . . "HIGH" No . . . Open
10	ALIVE	Output	Approximately 100Hz pulse is output from this pin when the chip operation is restarted after resetting. This pin senses if the chip is operating normally. (P-ch open drain)
11	FROUT	Output	This pin becomes "HIGH" when the system is turned OFF because of mechanism operation error. (Not used)
12	$\overline{F}$/R	Output	Indicates whether the tape motion is in forward or reverse mode. (Not used) Forward . . . Open Reverse . . . "HIGH"
13	N · C		(Not used)
14	K1	Input	Input pin for key scanning return signal (Gate input): The key pressed is determined by the following table.
15	K2	Input	
16	K3	Input	
17	K4	Input	
18	N · C		GND
19	N · C		GND
20	$\overline{\text{CHECK 1}}$	Input	See page 44*
21	$\overline{\text{CHECK 2}}$	Input	See page 44*
22	$\overline{\text{MS}}$	Input	Music signal input (Gate input): The existence of the music signal is detected by using the internal timer.
23	V SENSE	Input	Input pin for voltage detection circuit signal "LOW . . . Normal "HIGH" . . . Abnormal When this pin goes "HIGH," a leading MUTE signal is output, then all operation is stopped and the circuit waits until the pin goes "LOW."
24	D1	Output	Output pin for strobe signal used to scan keys (D4 is not used) (CMOS output)
25	D2	Output	
26	D3	Output	
27	D4	Output	
28	DBX	Output	Not used
29	70μ	Output	Equalizer switching output (CMOS output): While the deck is in operation, the contents of "70μs ON/OFF memory" is output from this pin.
30	NR	Output	Dolby ON/OFF output terminal (CMOS output): While the deck is in operation, the contents of " Dolby ON/OFF memory" is output from this pin. This pin goes "HIGH" when Dolby is ON.
31	$\overline{B}$/C	Output	Dolby B/C switching output (CMOS output)(Not used): While the deck is in operation, the contents of "Dolby B/C memory" is output from this pin. Dolby B or Dolby OFF . . . "LOW" Dolby C . . . "HIGH"
32	VDD		Power source (+5V)
33	$\overline{\text{SCK}}$	Input/ Output	Input/output pin for the clock for 8-bit serial data communication. In the input mode, this pin is remains high impedance. In the output mode, a CMOS level clock signal is output.
34	SI	Input	8-bit serial data input (MOS gate input)

	D1	D2	D3
K1	DOOR SW		
K2	RPT	TAPE /GE/LEV	R
K3	SCAN	TAPE /AUX	F
K4		OPEN /EJ	BS

- Q729 transistor switch is used as the door switch.
- TAPE/AUX, TAPE/GE/LEV, BS, F and R signals are stored in the back-up memory.



Pin No.	Pin name	I/O	Function and Operation
35	SO	Output	8-bit serial data output (CMOS output)
36	$\overline{\text{BUSY}}$	Input/output	Input-Output pin for BUSY signal for 8-bit serial data communication • When there is an interrupt for the serial data line, this pin goes "LOW." When the interrupt handling process ends and the chip is ready to accept next serial interrupt, this pin goes "HIGH." • While serial data is being output, the input to this pin is checked. If "LOW" signal is input, the data output is interrupted until a "HIGH" is input. Input . . . . . MOS gate circuit Output . . . . N-ch open drain circuit.
37	DAN B	Output	Disable +B line control output (CMOS output): When ACC is ON, this pin goes "HIGH" (disables lower order systems) so that lower order system (external input) in not activated before the deck. When the deck is OFF, this pin goes "LOW" so that lower order systems are enabled. While the deck is in operation, this pin is always "HIGH."
38	$\overline{\text{STOP}}$	Output	Capstan motor ON/OFF control output (CMOS output) • This pin goes "LOW" when the deck is OFF or while the cassette is being loaded. • When the deck is in operation, this pin is "HIGH" except while the mechanism is switching from FF/REW to PLAY or Release.
39	$\overline{\text{PLAY}}$	Output	Output pin for MS filter switching when the deck is in PLAY or FF/REW mode (N-ch open drain) • When the deck is in operation and PLAY is selected, this pin is "LOW" In other modes, it is "HIGH" • When the deck is not in operation or a cassette is being loaded, "LOW" is output.
40	STBY2	Output	This pin is connected to STBY2 of the deck driver IC702 (PA3019) to control the driver. (CMOS output) • This pin goes "HIGH" only when the PD3039 is hardware-reset.
41	$\overline{\text{STBY1}}$	Output	This pin is connected to STBY1 of the deck driver IC702 (PA3019) to control the driver. (CMOS output) • This pin stays "HIGH" while the deck is in operation. • When the deck operation is initiated, a "HIGH" is output (release stand-by) 100ms before outputting control data (MD0 to 2).
42	MD2	Output	Pin for outputting control data for the deck driver IC702 (PA3019) (CMOS output)
43	MD1	Output	
44	MD0	Output	
45	RES	Input	Input pin for the rotational pulse of the reverse side reel unit: When the level of this pin alternates between "HIGH" and "LOW," reel is considered to be rotating. IF "HIGH" or "LOW" continues unchanged for more than 1.2sec, PD3039 consideres that the tape has come to the end.
46	NES	Input	Input pin for the rotational pulse of the forward side reel unit: The detection method is the same as pin 45
47	$\overline{\text{IRQ}}$	Input	Input pin for an external timer: If the deck is in operation, when this pin goes "LOW," the deck is released, and when this pin goes "HIGH," the deck enters the PLAY mode from the ATSC mode.
48	ACC	Input	Input pin for the automobile's ACC switch ON/OFF (MOS gate input)
49	RESET	Input	Input pin for initializing PD3039. (MOS gate input)
50	$\overline{\text{TEST}}$	Input	VDD
51	OSC1		4MHz clock oscillator circuit
52	OSC2		
53	Vss		GND
54	$\overline{\text{AUX}}$	Input	AUX mode input: If ACC is ON and the deck is OFF and when this pin goes "LOW," the AUX mode is activated and the audio circuit and display are enabled.
55	GCL	Output	Output pin for electronic volume control IC651 (TC9187N) initialization signal for graphic equalizer (CMOS output) • A 20μs pulse is output when the deck or AUX is ON.
56	$\overline{\text{PEE}}$	Output	Key sound gate pulse output (CMOS output). When a key input is valid, a gate pulse is output to activate the key sound oscillator (IC703).
57	VDT	Output	Output pin for volume control data line control (N-ch open drain): When a command to output data to the electronic volume control and graphic equalizer is received from the display controller IC901 (PD4069), this pin becomes open circuit. When PD3039 confirms that it has finished sending the data, this pin goes "LOW."

Pin No.	P
58	SW
59	SW
60	SW
61	SW
62	ST
63	ST
64	ST

*Pin 20 and 21 the levels of the

MODE
(1) Communicati OFF mode
(2) Reduced time mode

Pin 20 and 21 are up by resistors.

(1) Communica

- The system troller IC90 nicating one OFF mode, only be perf anism functi If the mecha anism has st try in the operates pr operation is
- In the comm display contr can be used shown in the

	D2 (pi
K1	DOLB
K2	—
K3	—
K4	—

Check key

Pin No.	Pin name	I/O	Function and Operation
58	SW1	Input	Sensing switch matrix input (MOS gate input):
59	SW2	Input	The head and gear positions are determined by the following table:
60	SW3	Input	
61	SW4	Input	
62	ST1	Output	Output pin for strobe signal for sensing switch matrix (P-ch open drain)
63	ST2	Output	
64	ST3	Output	

	SW1	SW2	SW3	SW4	
ST1	FP	MS	EJ	RP	← Head position
ST2	L	–	C	R	← Gear position
ST3	CST IN	CST SET	70μs	–	← Cassette

*Pin 20 and 21 are not used by the KPX-777. When PD3039 is reset, however, the following modes are set according to the levels of these pins:

MODE	CHECK2 (pin 21)	CHECK1 (pin 20)
(1) Communication OFF mode	L	H
(2) Reduced timer mode	H	L

Pin 20 and 21 are usually "HIGH" as they are pulled up by resistors.

(1) Communication OFF Mode

- The system controller IC701 (PD3039) and display controller IC901 (PD4069) usually operate while communicating one another. However, in the communication OFF mode, there are some limited functions that can only be performed by the system controller (i.e., mechanism function).
  If the mechanism is released immediately after the mechanism has started operation and the deck is turned OFF, try in the communication OFF mode. If the system operates properly this time, the cause for the faulty operation is considered to be a communication error.
- In the communication OFF mode, the keys read by the display controller cannot be used. However, check keys can be used by setting the switches on the key matrix as shown in the following table.

	D2 (pin 25)	D4 (pin 27)
K1	DOLBY B	DIR/REL
K2	—	FF
K3	—	REW
K4	—	DOLBY C

Check key

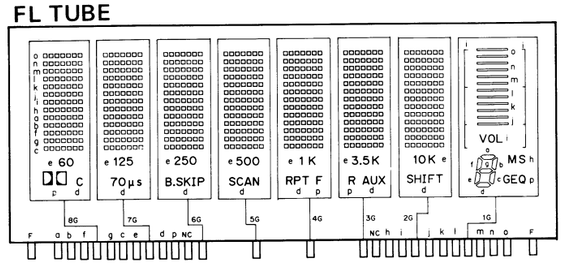
(2) Reduced Timer Mode

If CHECK1 is set to "LOW" in this mode, the system enters the reduced timer mode in normal operation as well as after being reset.
(The reduced timer mode is selected when CHEK1 is set to "LOW," it is released when CHECK1 is set to "HIGH."

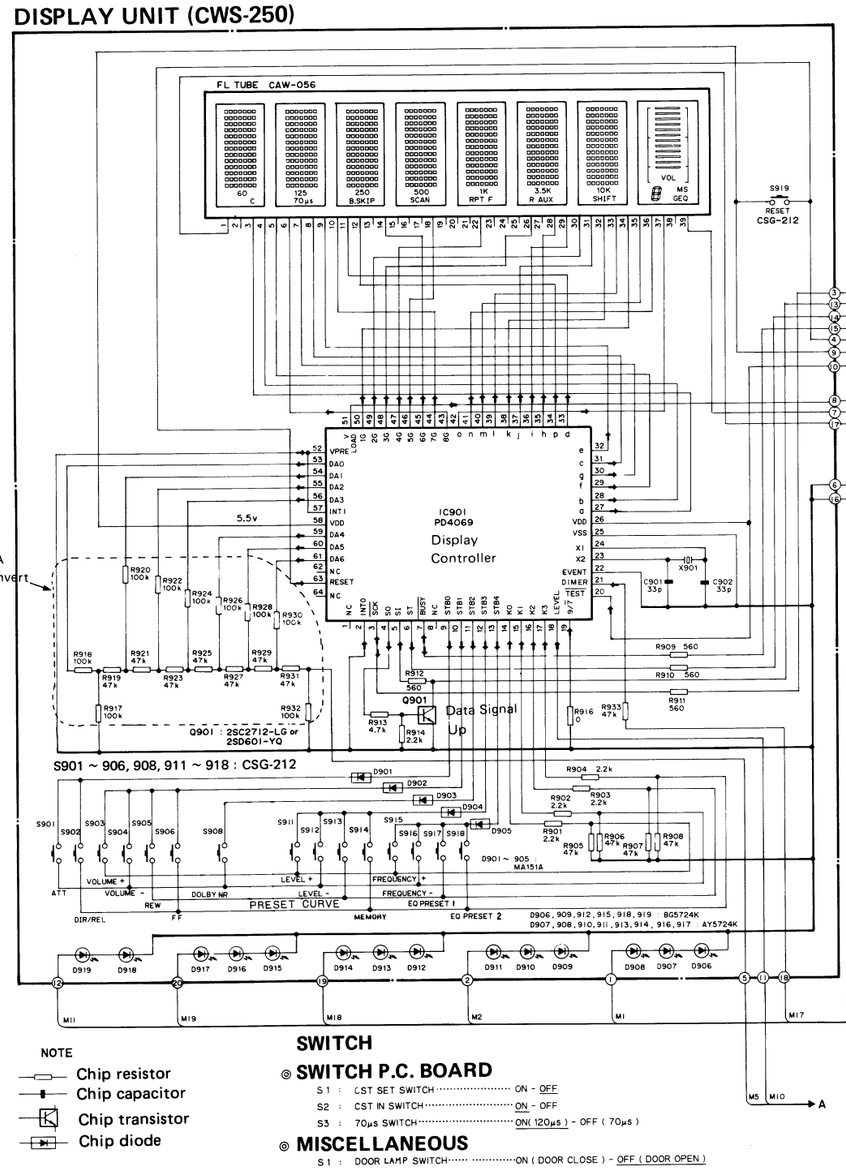
Item	Normal timer	Reduced timer
ACC ON chattering	1 second	0 second
VSENSE ON chattering	1 second	0 second
ATSC error timer	12 second	6 second
SCAN STH timer	12 second	6 second
BS (blank skip) timer	13 second	2 second

10. SCHEMATIC CIRCUIT DIAGRAM

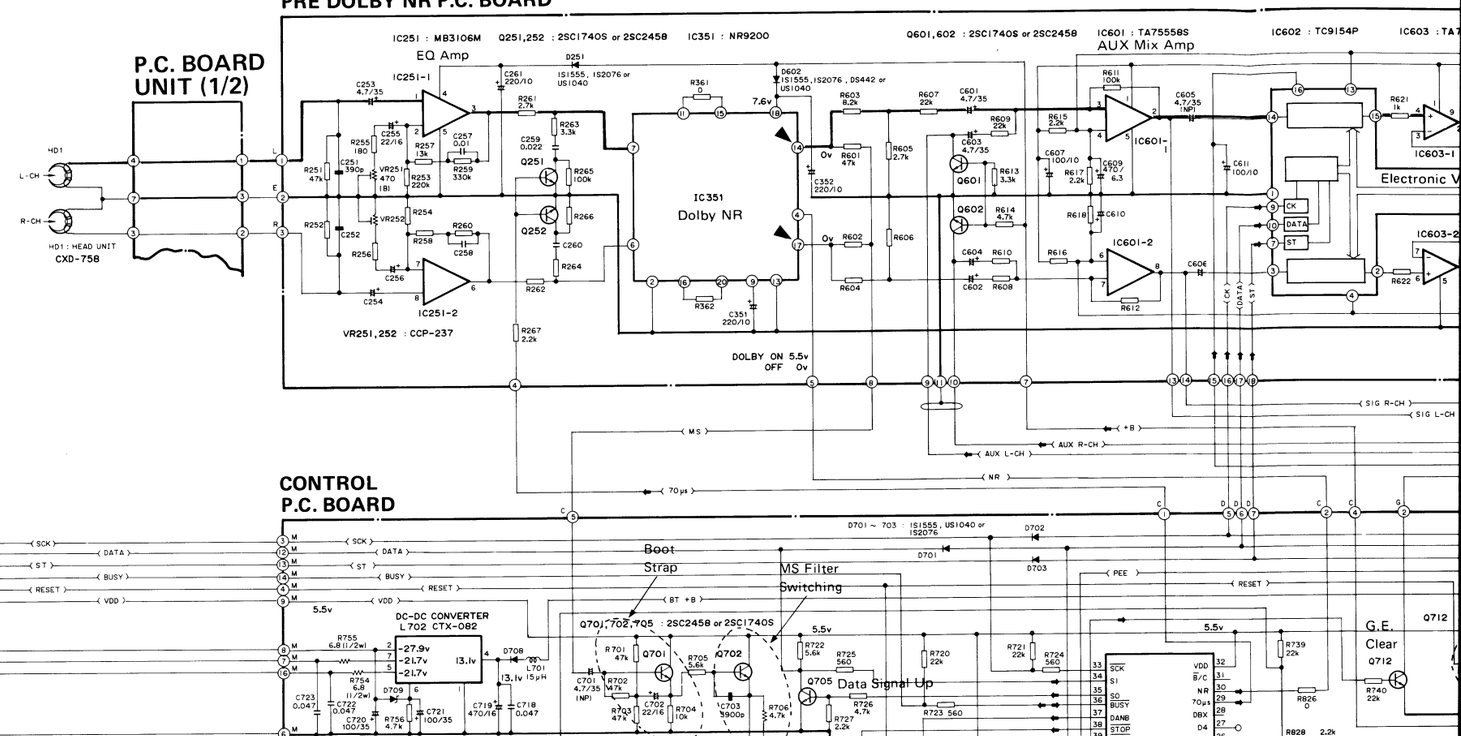
FL TUBE



DISPLAY UNIT (CWS-250)

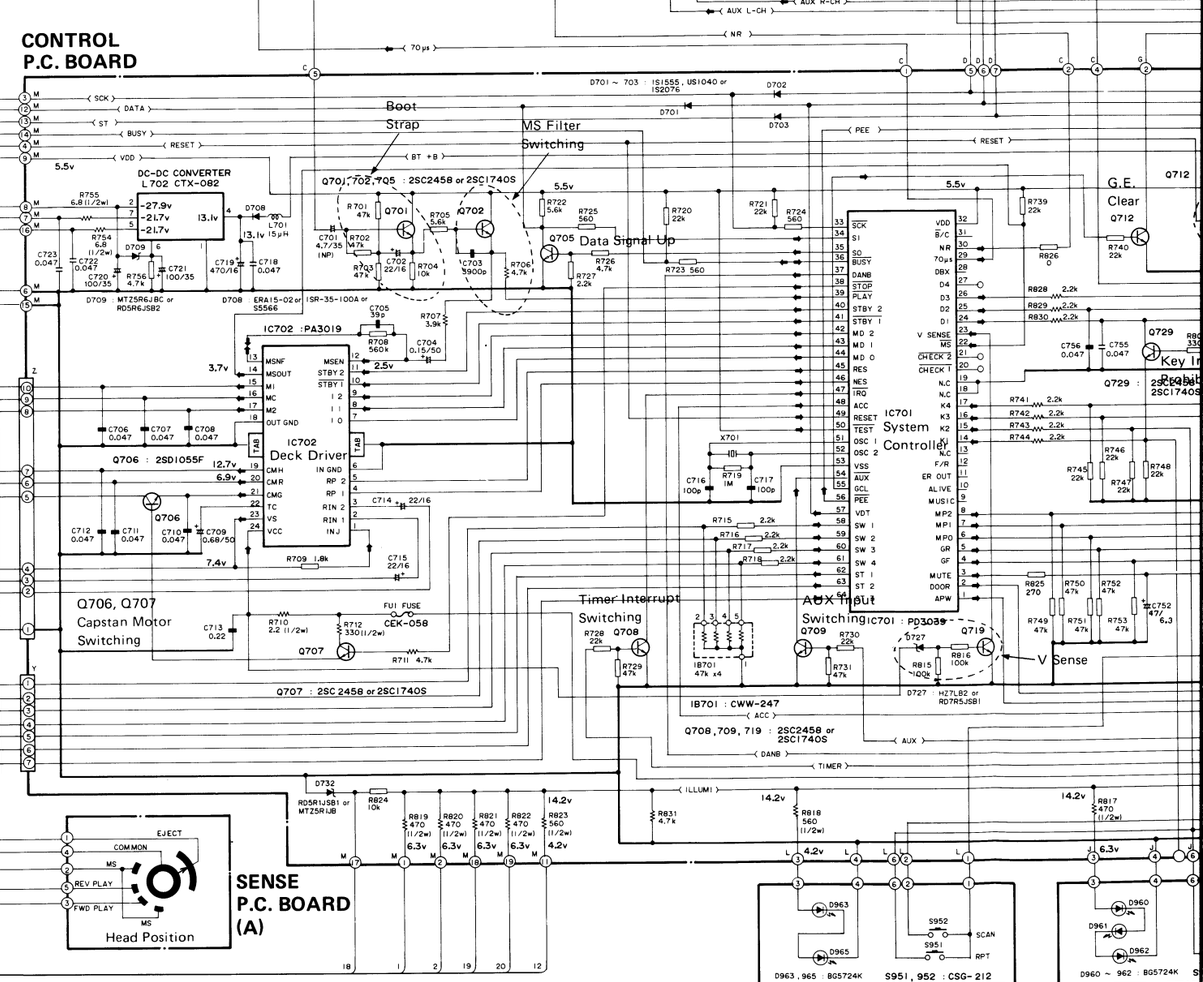


PRE DOLBY NR P.C. BOARD

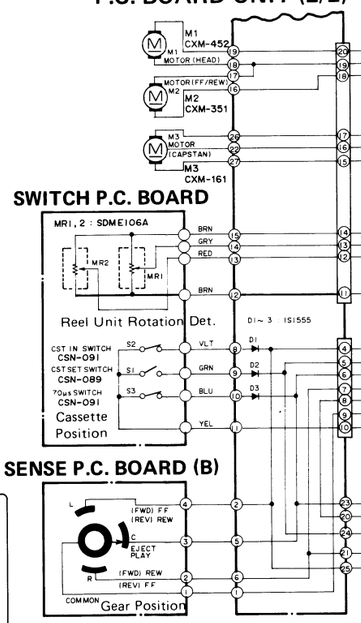


P.C. BOARD UNIT (1/2)

CONTROL P.C. BOARD



P.C. BOARD UNIT (2/2)



SWITCH P.C. BOARD

SENSE P.C. BOARD (B)

NOTE

- Chip resistor
- Chip capacitor
- Chip transistor
- Chip diode

SWITCH

◎ SWITCH P.C. BOARD

S1 : CST SET SWITCH ····· ON - OFF

S2 : CST IN SWITCH ····· ON - OFF

S3 : 70µs SWITCH ····· ON(120µs) - OFF (70µs)

◎ MISCELLANEOUS

S1 : DOOR LAMP SWITCH ····· ON (DOOR CLOSE) - OFF (DOOR OPEN)

The underlined indicates the switch position.

G.E. UNIT (CWM-353)

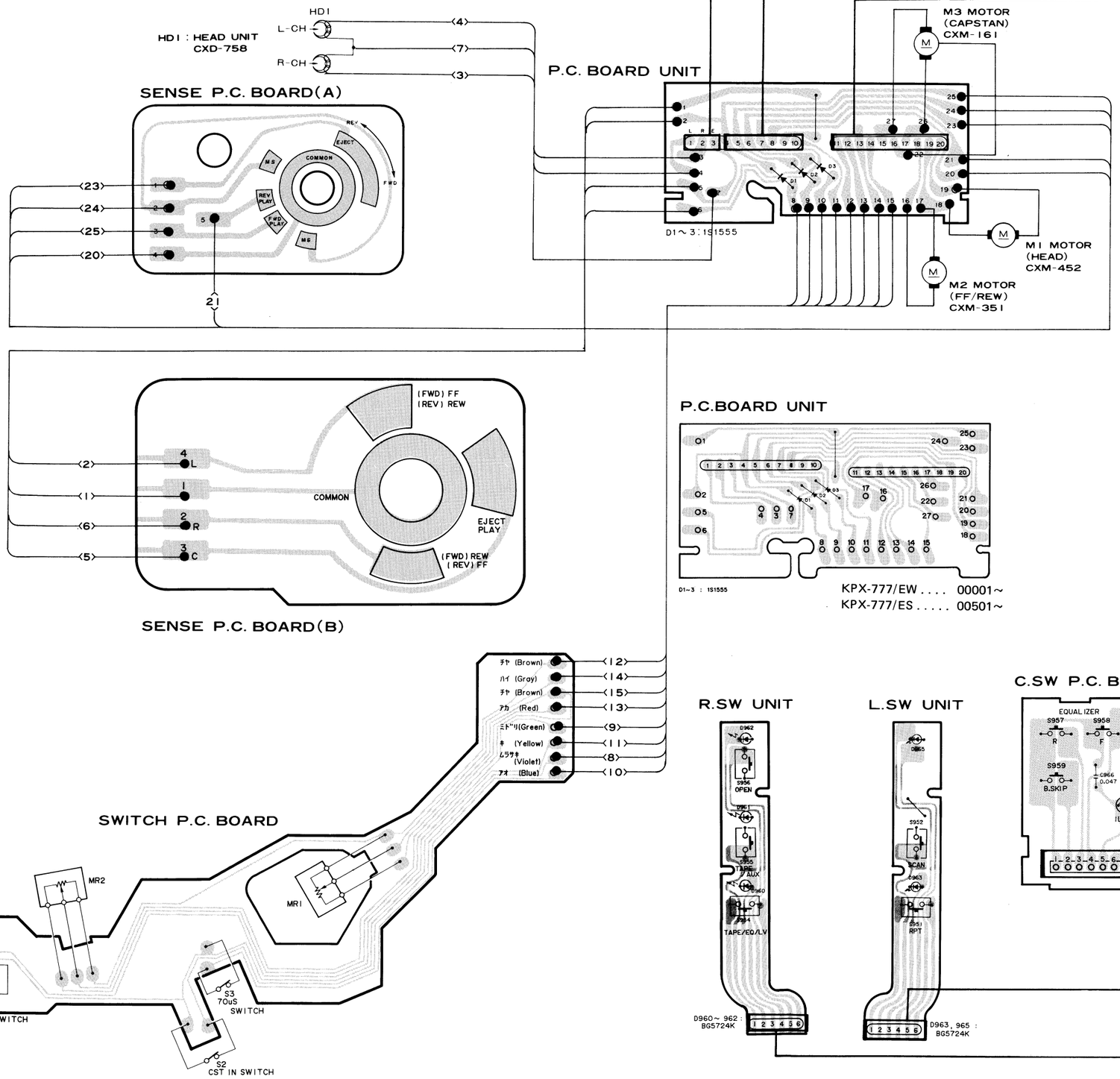
IC601 : TA7555BS
AUX Mix Amp
IC602 : TC9154P
IC603 : TA7555BS
IC604 : M5220L
IC601-1
IC601-2
IC603-1
IC603-2
IC604-1
IC604-2
Electronic Volume
Buffer Amp
IC601 System Controller
Key Input Prohibition
Reset circuit
G.E. Clear
V Sense
Pre Dolby NR Power Switching
Power Supply of Audio
Tape Audio Power Switching
DISABLE +B switching
BT +B Circuit
Power supply of G.E./LEV
Door Lamp Driver
Door Solenoid Drive
Power Supply of Isolator
IC652 : KHA206
IC651 : TC9187N
IC652
Graphic Equalizer
IC651
IC851, 852 : KHA207
Isolator
IC851
IC852
FRONT
REAR
AUX
IC710 : TA75558S
IC707 : TC4051BP
IC709 : HA17358
IC710-1
IC710-2
IC709-1
IC709-2
Buffer
Level Shifter
A-D Convert
Multiplexer
IC707
IB702, 703 : CWW-252
IC 703 TC4001BP
PEE OSC
Power supply of IC701
IC708 : MN1280 V sense IC
Q703 : 2SA933S or 2SA1048
Q704 : 2SC2458 or 2SC1740S
Q712 , 720 : 2SC2458 or 2SC1740S
Q727 : 2SC9060
Q729 : 2SC2458 or 2SC1740S
Q713 : 2SC1740S or 2SC2458
Q714 : 2SA933S or 2SA1048
Q715, 717 : 2SC1740S or 2SC2458
Q716 : 2SA933S or 2SA1048
Q718 : 2SA934 or 2SB647A
Q722 : 2SC1740S or 2SC2458
Q723 : 2SC2634NC
Q724 : 2SC1740S or 2SC2458
Q725 : 2SB945
Q728 : 2SD1227M
Q721, 726 : 2SD1055F
Power supply of IC701
Power Supply
Q716 : IS1555, US1040 or IS2076
Q726 14.4v
Power Supply of Isolator
VOLUME P.C. BOARD
VR651 : BALANCE
VR652 : FADER
CCS-454
CCS-439
IL1 DOOR OPEN LAMP
CEL-180
S01 DOOR SOLENOID
CXP-041
S1 DOOR LAMP SWITCH
CSN-078
D710 : HZ6LC1 or RD6R2JSB2
D711 : IS1555, US1040 or IS2076
D712, 713 : IS1555, US1040 or IS2076
D714 : IS1555, US1040 or IS2076
D715 : HZ6LC1 or RD6R2JSB1
D716 : IS1555, US1040 or IS2076
D717 : MTZ9R1JAB
D718 : IS1555, US1040 or IS2076
D720 : IS1555, US1040 or IS2076
D721 : MTZ10JA
D722 : ERA15-02
D723, 731 : ERA15-02, 1SR-35-100A or S5566
D724 : HZ6LC1 or RD6R2JSB1
D728 : MTZ11JA
D729~730 : IS1555, US1040 or IS2076
D731
R. SW UNIT
S951, 952 : CSG-212
D960 ~ 962 : BG5724K
S954 ~ 956 : CSG-212
C. SW P.C. BOARD
S957 ~ 959 : CSG-212
IL2 : CEL-180
Connection is viewed from the direction of the arrow.

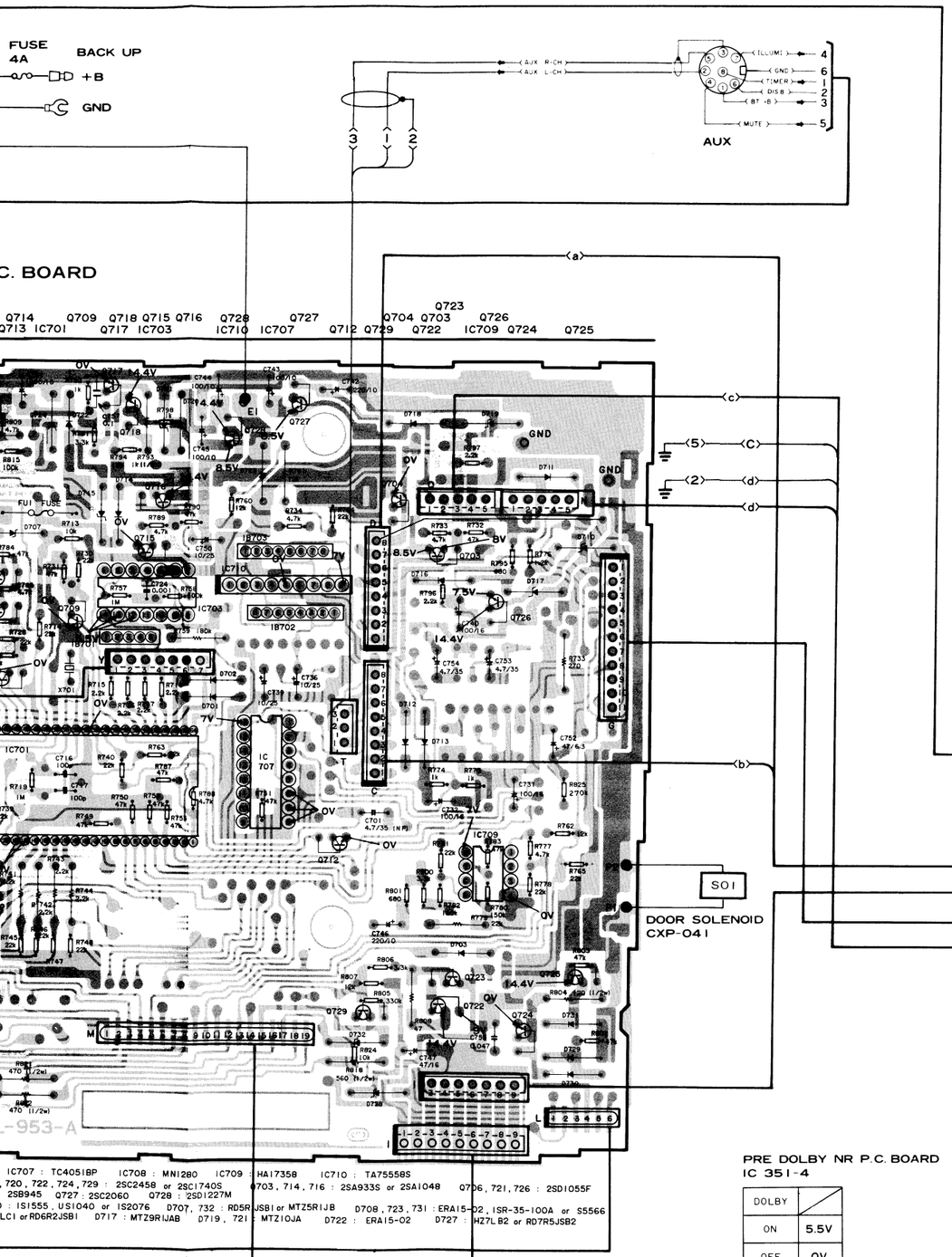
Audio Control Unit (CWM-352)

Consists of
- Control P.C. Board
- Pre Dolby NR P.C. Board

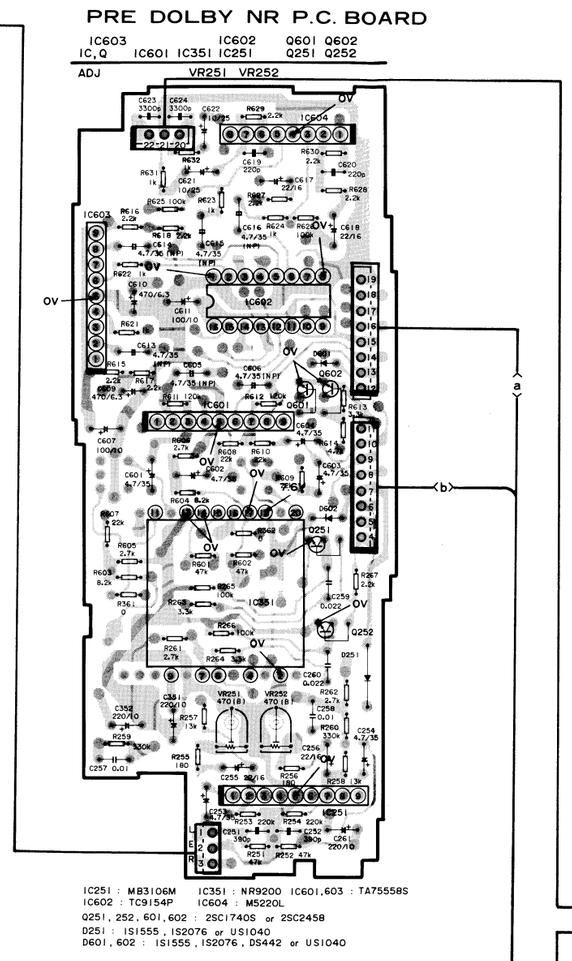
Fig. 32

11. CONNECTION DIAGRAM

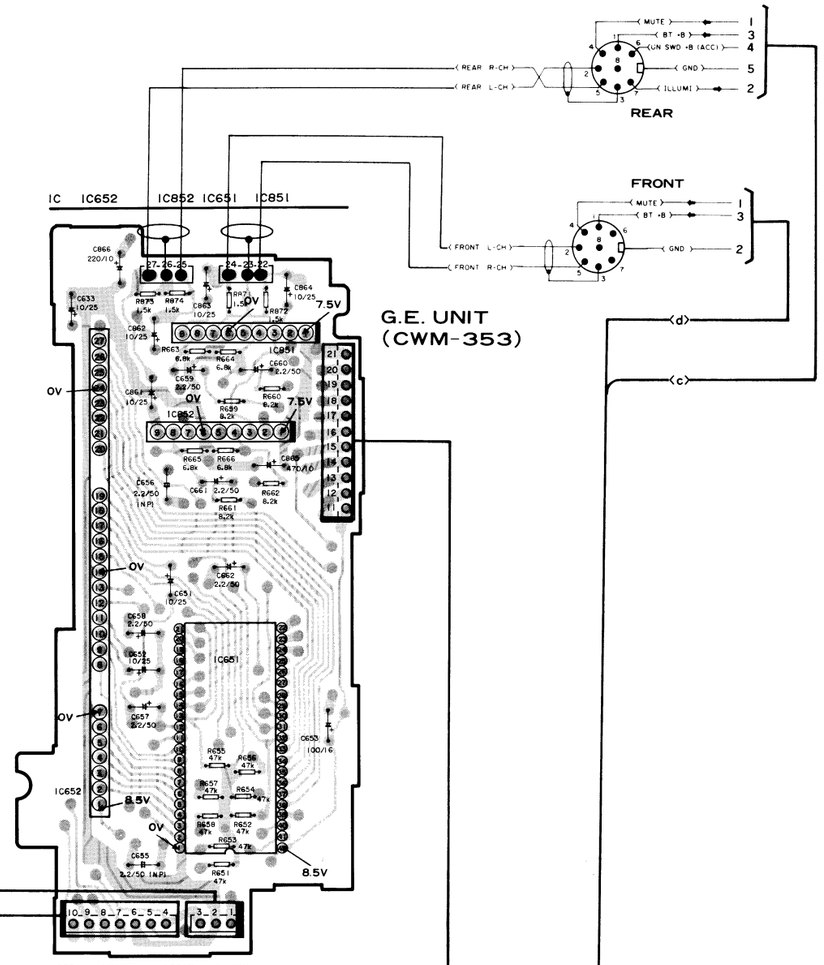




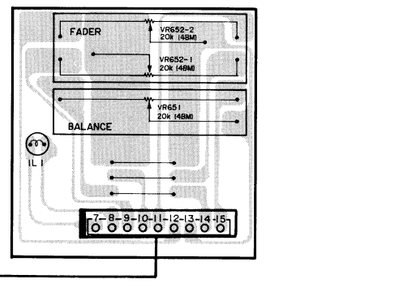
IC707 : TC4051BP IC708 : MN1280 IC709 : HA17358 IC710 : TA75558S
, 720, 722, 724, 729 : 2SC2458 or 2SC1740S D703, 714, 716 : 2SA933S or 2SA1048 Q706, 721, 726 : 2SD1055F
2SB945 Q727 : 2SC2060 Q728 : 2SD1227M
: IS1555, US1040 or IS2076 D707, 732 : RD5R1JSB1 or MTZ5R1JB D708, 723, 731 : ERA15-02, ISR-35-100A or S5566
LC1 or RD6R2JSB1 D717 : MTZ9R1JAB D719, 721 : MTZ10JA D722 : ERA15-02 D727 : HZ7LB2 or RD7R5JSB2



IC251 : MB3106M IC351 : NR9200 IC601,603 : TA75558S
IC602 : TC9154P IC604 : M5220L
Q251, 252, 601, 602 : 2SC1740S or 2SC2458
D251 : IS1555, IS2076 or US1040
D601, 602 : IS1555, IS2076, DS442 or US1040



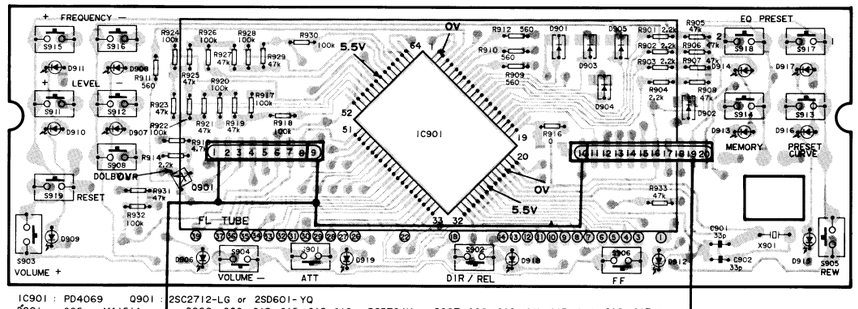
IC651 : TC9187N IC652 : KHA206
IC851, 852 : KHA207



PRE DOLBY NR P.C. BOARD
IC 351-4

DOLBY	
ON	5.5V
OFF	0V

DISPLAY UNIT(CWS-250)



IC901 : PD4069 Q901 : 2SC2712-LG or 2SD601-YQ
D901 ~ 905 : MA151A D906, 909, 912, 915, 918, 919 : BG5724K D907, 908, 910, 911, 913, 914, 916, 917 : AY5724K

Fig. 33

- Chassis (2)

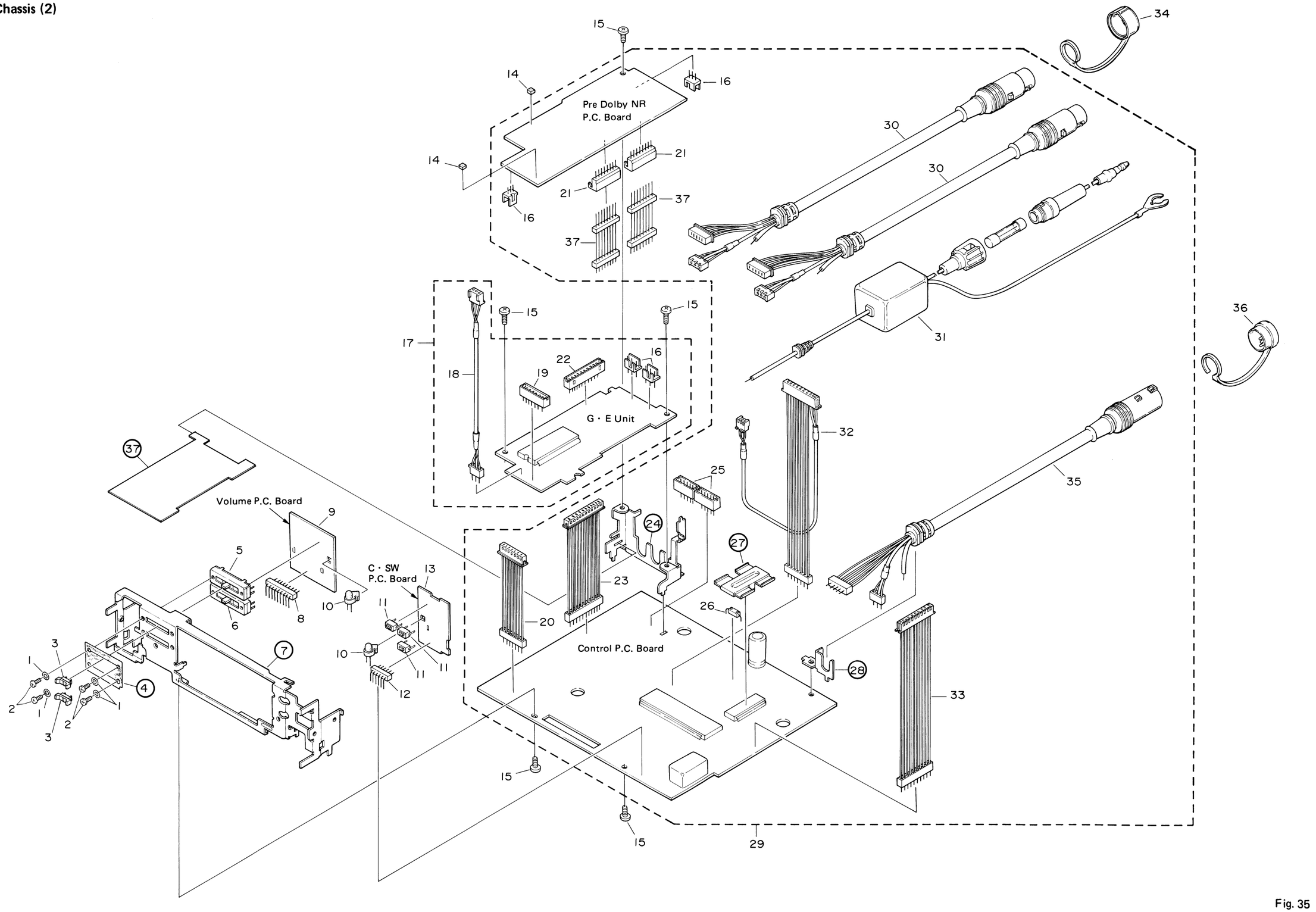


Fig. 35

14. ELECTRICAL PARTS LIST

NOTE:

When ordering resistors, first convert resistance values into code form as shown in the following examples.

Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).

560Ω	*56 × 10¹*	*561*	*RD1/4PS 5 6 1 J*
47kΩ	*47 × 10³*	*473*	*RD1/4PS 4 7 3 J*
0.5Ω	*0R5*		*RN2H 0 R 5 K*
1Ω	*010*		*RS1P 0 1 0 K*

Ex. 2 When there are 3 effeictive digits (such as in high precision metal film resistors).

5.62kΩ	*562 × 10¹*		*RN1/4SR 5 6 2 1 F*

- *For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★: GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *Parts whose parts numbers are omitted are subject to being not supplied.*
- *The part numbers shown below indicate chip components.*
  Chip Resistor
  RS1/8S □□□J
  Chip Capacitor (except for CQS·····)
  CKS·····, CCS·····

Display Unit (CWS-250)

Mark	Symbol & Description	Part No.
★★	IC901	PD4069
★★	Q901 Chip Transistor	2SC2712-LG or 2SC2712-LY or 2SD601-YQ or 2SD601-YR
★	D901 – 905 Chip Diode	MA151A
★	D906, 909, 912, 915, 918, 919 LED	BG5724K
★	D907, 908, 910, 911, 913, 914, 916, 917 LED	AY5724K
★★	S901 – 906, 908, 911 – 919 Switch	CSG-212
	X901 Ceramic Resonator	CSS-049
	FL Tube	CAW-056
	R901 – 914, 916 – R933	RS1/8S □□□J
	C901, 902	CCSCH330J50

R · SW Unit

Mark	Symbol & Description	Part No.
★	D960 – 962 LED	BG5724K
★★	S954 – 956 Switch	CSG-212

L · SW Unit

Mark	Symbol & Description	Part No.
★	D963, 965 LED	BG5724K
★★	S951, 952 Switch	CSG-212

Audio Control Unit (CWM-352)

Consists of
- Control P.C. Board
- Pre Dolby NR P.C. Board

Audio Control Unit (CWM-352)

MISCELLANEOUS

Mark	Symbol & Description	Part No.
★★	IC251	MB3106M
★★	IC351	NR9200
★★	IC601, 603, 710	TA75558S
★★	IC602	TC9154P
★★	IC604	M5220L
★★	IC701	PD3039
★★	IC702	PA3019
★★	IC703	TC4001BP
★★	IC707	TC4051BP
★★	IC708	MN1280
★★	IC709	HA17358
★★	Q251, 252, 601, 602, 701, 702, 704, 705, 707 – 709, 712, 713, 715, 717, 719, 720, 722, 724, 729	2SC1740S or 2SC2458
★★	Q703, 714, 716	2SA933S or 2SA1048
★★	Q706, 721, 726	2SD1055F
★★	Q718	2SA934 or 2SB647A

Mark	Symbol & Description	Part No.
★★	Q723	2SC2634NC
★★	Q725	2SB945
★★	Q727	2SC2060
★★	Q728	2SD1227M
★	D251, 601, 602, 701 – 703, 711 – 714, 716, 718, 720, 725, 726, 729, 730	1S1555 or 1S2076 or US1040
★	D707, 732	RD5R1JSB1 or RD5R1JSB2 or MTZ5R1JB
★	D708, 723, 731	ERA15-02 or 1SR-35-100A or S5566
★	D709	MTZ5R6JBC or RD5R6JSB2
★	D710, 715, 724	HZ6LC1 or HZ6LC2 or RD6R2JSB1 or RD6R2JSB2
★	D717	MTZ9R1JAB
★	D719, 721	MTZ10JA
★	D722	ERA-15-02
★	D727	HZ7LB2 or HZ7LB3 or RD7R5JSB2 or HZ7LB1
★	D728	MTZ11JA
	L701 Ferri-Inductor	CTF-156
	L702 Transformer	CTX-082
	IB701	CWW-247
	IB702, 703	CWW-252
★★	VR251, 252 Volume, 470Ω (B)	CCP-237
	X701 Ceramic Resonator	CSS-048
★★	FU1 Fuse, 1A	CEK-058

RESISTORS

Mark	Symbol & Description	Part No.
	R706, 707, 711, 741 – 744, 759, 761, 779, 808, 812, 813, 828 – 830	RD1/4PM □□□J
	R710, 712, 754, 755, 793, 804, 817 – 823	RD1/2PS □□□JL or RN1/2P □□□ JL
	R831	RD1/6PS472J
	Other Resistors	RS1/8S □□□J

CAPACITORS

Mark	Symbol & Description	Part No.
	C251, 252	CKSYB391K50
	C253, 254	CEANL4R7M35LL
	C255, 256, 617, 618, 702, 714, 715	CEA220M16LS
	C257, 258	CQMA103J50LL
	C259, 260	CQEA223J50
	C261, 351, 352, 742, 746	CEA221M10L2
	C601 – 604, 753, 754	CEA4R7M35LS
	C605, 606, 613 – 616, 701	CEA4R7M35NPLL
	C607	CEA101M10LL
	C609, 610	CEA471M6R3L2
	C611, 743 – 745	CEA101M10L2
	C619, 620	CCSSL221J50
	C621, 622, 736, 739, 750	CEA100M25LS
	C623, 624	CKSYB332K50
	C703	CKSYB392K50
	C704	CEAR15M50LS2
	C705	CCSCH390J50
	C706 – 708, 710 – 712, C756	CKSYF473Z50
	C709	CEAR68M50LS2
	C713	CKSYF224Z25
	C716, 717	CCSCH101J50
	C718, 722, 723, 755	CQEA473J50
	C719 470μF/16V	CCH-114
	C720, 721	CEA101M35L2
	C724	CKSYB102K50
	C731, 732, 740	CEA101M16LL
	C747	CEA470M16LS
	C748	CEAR47M50LS2
	C749	CEA0R1M50LS2
	C751	CEA102M16L2
	C752	CEA470M6R3LS
	C757	CQMA103J50L

G.E. Unit (CWM-353)

MISCELLANEOUS

Mark	Symbol & Description	Part No.
★★	IC651	TC9187N
★★	IC652	KHA206
★★	IC851, 852	KHA207

RESISTORS

Mark	Symbol & Description	Part No.
	R651 – 666, 871 – 874	RS1/8S □□□J

CAPACITORS

Mark	Symbol & Description	Part No.
	C651, 652, 864	CEA100M25LS
	C653	CEA101M16LL
	C655, 656	CEA2R2M50NPLL
	C657 – 662	CEA2R2M50LS2
	C663, 861 – 863	CEA100M25LS
	C865	CEA471M10L2
	C866	CEA221M10L2

Volume P.C. Board

Mark	Symbol & Description	Part No.
★★	VR651 Volume, 20kΩ (4BM)	CCS-454
★★	VR652 Volume, 20kΩ (4BM)	CCS-439
★★	IL1 Lamp	CEL-180

C. SW P.C. Board

Mark	Symbol & Description	Part No.
★★	S957 – 959 Switch	CSG-212
★★	IL2 Lamp	CEL-180
	C966	CQEA473J50

Switch P.C. Board

Mark	Symbol & Description		Part No.
★★	S1	Switch (CST SET)	CSN-089
★★	S2, 3	Switch (CST IN, 70μS)	CSN-091
	MR1, 2	Magnetic Resistive Device	SDME106A

P.C. Board Unit

Mark	Symbol & Description	Part No.
★	D1 – 3	1S1555

Miscellaneous Parts List

Mark	Symbol & Description		Part No.
★★	Head Unit		CXD-758
★★	M1	Motor (Head)	CXM-452
★★	M2	Motor (Gear)	CXM-351
★★	M3	Motor (Capstan)	CXM-161
★	SO1	Solenoid (Door Open)	CXP-041
★★	S1	Switch (Door Lamp)	CSN-078

15. PACKING METHOD

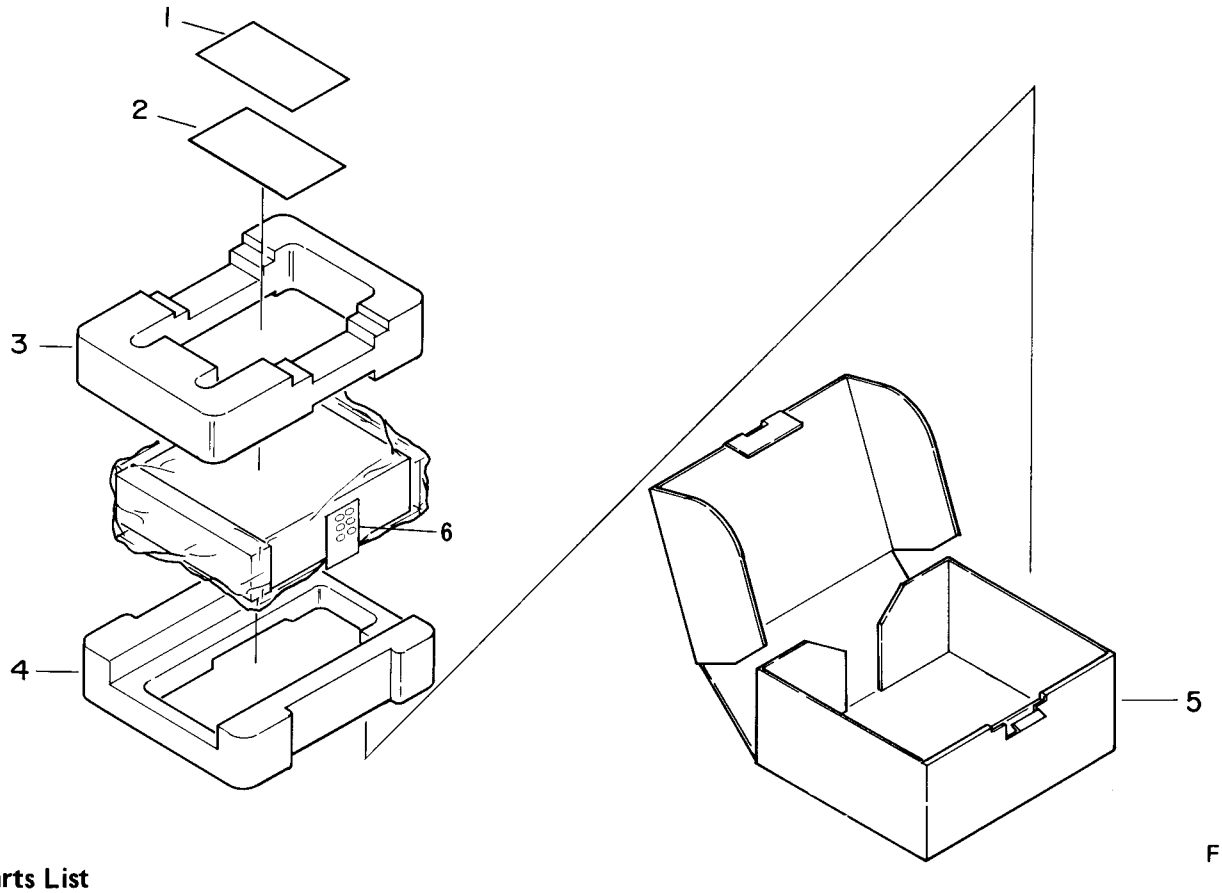


Fig. 36

• Parts List

Mark	No.	Part No.	Description
	1.	CRD1003	Owner's Manual (/EW) (English, French, German, Spanish)
		CRD1004	Owner's Manual (/EW) (Swedish, Norwegian, Dutch, Italian)
		CRD1015	Owner's Manual (/ES) (English, French, Spanish, Arabic)
	2.	CEA-727	Accessory Kit
	2-1.	CDE-437	Cord
	2-2.	CNF-111	Strap
	2-3.		Screw Kit
	2-3-1.	CBA-028	Screw for Strap
	2-3-2.	B70-055-A	Nut
	2-3-3.	B70-056-A	Nut
	2-3-4.	WS40FMC	Washer
	2-3-5.	HMF40P080FZK	Screw
	2-3-6.	CNN-058	Spacer
	2-3-7.	CBA-102	Screw
	3.	CHF-298	Styrofoam
	4.	CHF-299	Styrofoam
	5.	CHG1008	Carton (/EW)
		CHG1007	Carton (/ES)
	6.	CNB-723	Mounting Bracket